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From a Daguerreotype by Lawrence

Adoniram Chandler

late Corresponding Secretary of the American Institute

TRANSACTIONS

OF THE

AMERICAN INSTITUTE

OF THE

CITY OF NEW-YORK,

FOR THE YEAR

1854.

ALBANY:
C. VAN BENTHUYSEN, PRINTER TO THE LEGISLATURE.
.....
1855.

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1854

AMERICAN INSTITUTE.

TRUSTEES AND COMMITTEES FOR 1854.

President,
ROBERT L. PELL.

Vice-Presidents,
ROBERT LOVETT,
D. MEREDITH REESE,
LIVINGSTON LIVINGSTON.

Recording Secretary,
HENRY MEIGS.

Corresponding Secretary and Agent,
PETER B. MEAD.

Treasurer,
EDWARD T. BACKHOUSE.

Committee on Finance.

John A. Bunting,
George Bacon,
N. G. Bradford,
George Dickey,
James R. Smith.

Managers of the 27th Annual Fair,

John A. Bunting,
Joseph Torrey,
James R. Smith,
Isaac V. Brower,
William Ebbitt,
F. W. Geissenhainer, Jr.,
Benedict Lewis, Jr.,
William Hall,
Edwin Smith,
Joseph Cowdin,
Clarkson Crolius,
William B. Leonard,
George C. Mann,
John Gray,
William A. Whitbeck,
John V. Targee,
William C. Arthur,
William K. Strong,
Jacob C. Parsons,
John N. Genin,
Henry R. Dunham,
George F. Nesbitt,
W. H. Dikeman,
Samuel D. Backus.

Committee on Agriculture,

David Banks,
Robert S. Livingston,
Thomas Bell,
Nicholas Wyckoff,
D. K. Sherwood.

24741

Committee on Commerce,

Alexander Knox,
Jonathan H. Ransom,
John Disturnell,
W. W. Dibblee,
Abraham Turnure.

Committee on Manufactures, Science and Arts,

James Renwick,
James J. Mapes,
Edwin Smith,
Chester Coleman,
Joseph M. Sanderson.

Committee on the Admission of Members,

George F. Barnard,
Hiram Dixon,
James F. Hall,
John W. Chambers,
Henry Meigs.

Committee on Correspondence,

F. P. Schoals,
James H. Titus,
Linus W. Stevens,
William H. Browne,
S. R. Comstock.

Committee on the Library,

Liv. Livingston,
Ralph Lockwood,
William A. Whitbeck,
William Hibbard,
Jacob C. Parsons.

State of New-York.

No. 144.

IN ASSEMBLY, MAR. 16, 1855.

ANNUAL REPORT OF THE AMERICAN INSTITUTE.

NEW-YORK, *March* 15, 1855.

To the Hon. D. C. LITTLEJOHN,
Speaker of the Assembly.

Sir:—I herewith transmit the annual report of the American Institute of the city of New-York, for the year 1854.

Very respectfully,
Your obedient servant,
PETER B. MEAD,
Corres. Sec'y.

THIRTEENTH ANNUAL REPORT
OF THE TRUSTEES OF THE AMERICAN INSTITUTE.

In compliance with the requirements of law, the trustees of the American Institute herewith present their

ANNUAL REPORT.

The active circle of the Institute having during the past year, been somewhat circumscribed by the suspension of its annual fair, the subjects of this report may be comprised within a brief space. It will be proper to state here succinctly the causes which led to an interregnum in our annual fairs. This is the more necessary, because the subject is not in some quarters, referred to its proper cause. There are some who suppose that the American Institute suspended its annual fair because of the Crystal Palace. This is a great mistake. If the Institute would not forego its annual fair when the Crystal Palace was in the noontide of its glory, it is not to be supposed that it would do so when the Crystal Palace had lost all the prestige which greeted its opening.

To do away any misapprehension which may still exist on this subject, it may be well to state the reasons which governed the Institute in suspending its fair for 1854. At its annual meeting in February, the New-York State Agricultural Society selected New-York city for holding its next annual fair. It needed but little reflection to convince all parties that two great fairs could not be held in this city at the same time, without materially detracting from the interest of both. But who should give way? The State Society took the initiative, and prior to our annual election appointed a committee to wait upon the Institute. The latter appointed a committee of conference, and an arrangement was effected, that the Institute would suspend its own fair, and unite with the State Society. This arrangement was carried out in good faith by both parties, the Institute, however, not deriving therefrom any pecuniary advantage whatever; on the contrary,

it sacrificed the large income which it annually receives from its fairs, and upon which it mainly relies for conducting its operations. A custom has obtained, that wherever the State Society holds its fair, the local societies of the place unite with it; and thus not only the Institute, but also the Horticultural Society of this city, co-operated with the State Society at its last fair. It may be mentioned here, that the president of the Crystal Palace Association having expressed a desire that the Institute should hold its fair at the Crystal Palace, a committee of conference was appointed, but nothing was effected.

It has been stated that the Institute, in consequence of its connexion with the State Society, was cut off from its principal source of income. It has also sustained an additional loss in the non-occupancy of its store. These facts will account for the falling off in our receipts for the past year. It is a matter of sincere congratulation, however, that notwithstanding this, the Institute finds itself free from embarrassment.

But, though the operations of the Institute have been somewhat circumscribed, its usefulness has not been impaired. As far as possible, it has been attempted to carry out faithfully all the great objects for which the Institute was founded. The Farmer's Club has been instrumental in diffusing a large amount of useful information on the various topics relating to agriculture and horticulture; and its meetings possess so much interest for the farmer and others, that it is now no unusual thing to see sixty and seventy persons present, many of them coming from a considerable distance in the country, not occasionally, but with considerable regularity. At these meetings, all the recent improvements and novelties (whether relating to culture, or the instruments by which it is effected) are made subjects of discussion, and their merits duly canvassed. The proceedings of the Farmer's Club accompanying this report, will show the great variety of topics embraced in its discussions, and the enlarged sphere of usefulness to which they have been extended.

Increased attention has also been given to the mechanic arts and sciences. For the purpose of more directly stimulating these important subjects, a "Mechanic's Club" has been instituted,

which, it is hoped, will be productive of much good. It is proposed that the Mechanic's Club shall bear the same relation to the arts and sciences, that the Farmer's Club does to agriculture and horticulture. At its meetings should be found the best scientific and mechanical talent which our city affords, as well as the student and novice, and all whose studies or inclinations lead them to feel an interest in the development and advancement of American science and skill. We hope to be able hereafter to report some good results effected by the Mechanic's Club.

Our library has also been found an important aid in furthering the objects of the Institute. Well stored with standard works in all the departments of human learning, the student, the scholar, and the general reader each finds here timely aid and assistance in his scientific or literary pursuits; and the number of volumes daily taken from the library, shows that these valuable helps in the attainment of knowledge, are, to a very considerable extent, appreciated. The library now contains over 7,000 volumes. During the past year 244 volumes have been added, and among them some works of great value, such as "Bayle's Historical and Critical Dictionary," 5 vols. folio, London, 1734; "American Archives," by Peter Force (4th and 5th series), 9 vols. folio; "Smithsonian Contributions to Scientific Knowledge," 5 vols. 4to; "Schoolcraft's Indian Tribes of the United States," 2 vols. 4to, and many others.

It has already been announced that a fair will be held in the fall of 1855, and we confidently look forward to that co-operation and support, which have always been generously extended to our efforts to promote the productive skill and industry of our common country.

All of which is respectfully submitted.

ROBT. L. PELL,
LIV. LIVINGSTON,
D. M. REESE,
ROBT. LOVETT,
E. T. BACKHOUSE,
H. MEIGS,
PETER B. MEAD,
Trustees.

FINANCES.

The following is the financial condition of the American Institute on the 1st day of February, 1855:

Balance in the treasury Feb. 1, 1854,.....		$1,647 13
The Receipts of the year have been,		
From Treasurer of State of New-York,.	$950 00	
From rent of store No. 351 Broadway,.	2,500 00	
From interest on special deposit of $15,000,.....	945 82	
From interest on bond of $5,000,.....	109 88	
From admission fees and annual dues,.	1,746 00	
From duplicate gold and silver medals, &c., ...	40 00	
From certificates of award,.....	8 00	
From transactions,.....	2 00	
		6,301 70
From special deposit account,.....		15,000 00
From bond of $5,000,.....		5,000 00
From note discounted, $800, less interest $18.87,..		781 13
		$28,729 96

Payments.

Real Estate.

Interest on bond of $25,000,.....	$1,269 66	
On account of $25,000 bond, ...	12,000 00	
Allowance for rear building per agreement,.....	800 00	
Alterations of windows of store,.....	300 00	
Plastering,.....	10 00	
Removal of gas metre,.....	20 00	
Gas pipes in rear building,.....	45 25	
Taxes,.....	586 05	
Insurance,.....	140 50	
Carried forward,.....	$15,171 46	$28,729 96

Brought forward,.....		$15,171 46	$28,729 96
Library.			
Books and periodicals,.....	$287 74		
Subscription to newspapers,..	76 00		
Cushions for chairs,.....	9 00		
		372 74	
New-York State Agricultural Society.			
Amount contributed for exhibition,....		950 00	
Mechanics' Banking Association.			
Cash for note discounted,....$7,000 00			
Interest on do,.....	107 40		
		7,107 40	
On account of 24th Annual Fair.			
Repairs of engine,.....		33 50	
On account of 25th Annual Fair.			
Cash premium,.....		3 00	
On account of 26th Annual Fair.			
Premiums,.....	$859 95		
Printing, ...	64 50		
Bleaching muslin,.....	5 11		
Hardware,.....	2 06		
Belting for machinery,.....	10 00		
		941 62	
Miscellaneous Bills.			
Expenses of Farmer's Club:			
Reporting 24 meetings,....	$240 00		
Printing reports, &c., ...	42 00		
Insurance, library, &c.,.....	42 50		
Advertising,.....	48 35		
Blank books, copying press,			
stationery, &c.,.....	49 64		
Gas,.....	77 07		
Coal,.....	61 50		
Ice, 1853-54, ...	23 30		
Carried forward,.....		$24,579 72	$28,729 96

Brought forward,.....		$24,579 72	$28,729 96
Engraving duplicate medals,.	6 25		
Printing circulars, blanks, &c.,	40 50		
Directories,.....	3 75		
Carpenter's work,.....	6 75		
Freight of Transactions,.....	4 00		
Brushes,.....	2 00		
Watering street,.....	5 50		
Repairing and cleaning stoves,	9 70		
Agricultural committee expenses,.....	11 50		
Agent's expenses at Albany,..	38 00		
Commission on collections,...	36 40		
Petty cash-postage, advertising, cleaning, &c., &c.,....	279 28		
		1,027 99	
Salaries.			
Agent,.....	$600 00		
Recording Secretary,.....	600 00		
Clerk, ...	1,000 00		
Librarian,.....	600 00		
Boy,..... ...	223 33		
		3,023 33	
			28,631 04
Balance in treasury Feb. 1, 1855,..... ...			$98 92

AMOUNT OF PROPERTY HELD BY THE INSTITUTE FEBRUARY 1, 1855.

Real Estate.		
No. 351 Broadway, cost,.....	$45,000 00	
Less mortgage,.....	13,000 00	
		$32,000 00
Library and fixtures per report made to the Institute April 29, 1854,....	$10,594 25	
Books and periodicals added since,...	123 07	
		10,717 32
Office furniture, safes, &c.,.....		350 00
Property at Castle Garden—		
Steam boilers,.....	$1,100 00	
Shafting and pullies,.....	500 00	
Chandeliers,.....	170 00	
		1,770 00
Cash in treasury Feb. 1, 1855,.....		98 92
		$44,936 24
Less note discounted by Mechanics' Banking Association,.....		800 00
Total,.....		$44,136 24

JOHN A. BUNTING,
GEORGE BACON,
N. G. BRADFORD,
GEORGE DICKEY,
JA'S R. SMITH,
Finance Committee.

NEW-YORK, *Feb.* 3, 1855.

DEATH OF GEN. ADONIRAM CHANDLER,

Late Corresponding Secretary and Agent of the American Institute.

A special meeting of the members of the American Institute was held on Monday, October 16, 1854, at 2 o'clock P. M., for the purpose of making a suitable expression of the feelings of the members on this melancholy occasion.

Prof. Jas. Renwick alluded in feeling terms to the death of General Chandler, whose demise took place on Saturday, October 14, at 3 o'clock A. M., in the 62d year of his age, and moved the adoption of the following resolutions. The resolutions were seconded by Judge Meigs, who remarked that Judge Chandler had long been a prominent and useful member of our community. During the war of 1812, he went to the lines and offered himself as a volunteer; was at the battle of Queenstown, and signalized himself in that and other engagements during the war. He has, at different times, been president of the Mechanic's Society, and Director of the Mechanic's Bank, and several other public institutions, was a member of the Assembly of the State of New-York, and for many years Commissary General of the State. From the first formation of the American Institute, he has been one of its most active members, and was for a long time vice-president of the institution.

Resolved, That the members attend his funeral, to testify by this, their sense of his services to the Institute. The General has long been one of its fathers, and no one among us has been more fond of it. He certainly loved it as one of his own children. He was always ardent in every effort made by it to secure the independence of our country, by courage in battle and unswerving labors in the operations of this Institute. He began with it when

he was comparatively rich, and when it was not yet master of one dollar! By his co-operation this Institute has been independent in its circumstances, has done some good in the great cause of our own agriculture, commerce, manufactures, and arts, and has power remaining to gain distinction in coming years in this great American cause. May his devotion to the cause be followed by the good men of the future.

Lieut. Washington A. Bartlett, U. S. Navy, moved the following resolution:

Resolved, That in the death of General Adoniram Chandler, this society deplores the loss of a worthy citizen, a high-minded, honorable gentleman, and that we beg to unite our condolence with the members of his immediate family.

Resolved, That a copy of these resolutions be transmitted to the family of the general.

The resolutions were unanimously adopted.

The members then attended the funeral. The body was conveyed to the Church of the Annunciation, in 14th-st., near the 7th avenue. The funeral service was rendered impressively by the Rev. Dr. Seabury. The body remained in the church during the night, and was taken to Greenwood Cemetery the next day.

DEATH OF EDWIN WILLIAMS,

For many years Recording Secretary of the American Institute.

At a stated monthly meeting of the American Institute, held on Thursday, November 2d, 1854, Vice-President Livingston announced the sudden death by Asiatic cholera, of Edwin Williams, and offered the following resolutions:

Resolved, That we have heard with unfeigned regret, the sudden decease of Edwin Williams, one of the original members and founders of this institute, and for many years its Recording Secretary.

Resolved, That his labors in, and contributions to our stock of statistical and historical information, have rendered eminent service to those branches of knowledge in our country, and entitle him to the grateful remembrance of the Institute.

Resolved, That a copy of these resolutions be transmitted to his family by the Recording Secretary of the Institute.

On motion of Mr. John A. Bunting, the resolutions were unanimously adopted.

REPORTS OF THE COMMITTEE ON MANUFACTURES, SCIENCE, AND ARTS.

REPORT ON DR. O. S. LEAVITT'S FLAX MACHINERY, AND PROCESS OF MANUFACTURE.

The committee report that they have examined the samples of flax in various states of preparation exhibited to them by Dr. O. S. Leavitt, and have received from him full explanations of his processes, and the machinery by which he proposes to perform them.

In order that they might perform the duty assigned to them more satisfactorily, they have invited Colonel John Travers to aid them in their investigations, and to unite with them in their report.

1st. From the samples exhibited, it appears that by Dr. Leavitt's process, ripe flax, after being stripped of the seed, can be cleaned completely and prepared for manufacture *without being rotted.*

2d. That from the flax, in its earlier stages of preparation without rotting, rope, twine, and coarse fabrics may be made, with a great saving of manual labor.

3d. That by further mechanical processes, the gum, gluten, and resin, may be chiefly removed, and by the use of machinery, in aid of the usual chemical processes, the flax may be deprived entirely of its color, and rendered fit for the manufacture of fine linen. That the thread exhibited to them, apparently in consequence of the omission of the process of rotting, and the substitution of mechanical methods, for much of what has hitherto been performed chemically, is stronger than common linen thread.

4th. That the expensive and wasteful process of hackling is entirely superseded by Dr. Leavitt's processes, and the prepared material is delivered from the last of the cleansing processes in *rovings*, ready to be submitted to the usual spinning machines.

5th. That the flax cleaned, bleached, and formed into rovings, can, we believe, be produced at a cost much less than that of rotted and hackled flax unbleached, while the inventor claims, and adduces satisfactory arguments to prove the probability that flax ready for spinning into white thread will not exceed good cotton in its cost.

6th. Dr. Leavitt also claims that by a process of Kyanizing, applied during the preparation of both flax and hemp, the cordage made therefrom is rendered more durable and stronger, while the surface of the yarn is rendered smoother.

Admitting that the processes of Dr. Leavitt have no other advantages than those which your committee can state to be absolutely certain, your committee is of opinion that their result must be attended with very important consequences, and will, if carried into operation on an extensive scale, add much to the agricultural and manufacturing wealth of the United States.

(Signed.) JAMES RENWICK, Ch'n.,
JOHN TRAVERS,
JAS. J. MAPES,
EDWIN SMITH,
Committee.

NEW-YORK, 24*th May*, 1854.

REPORT ON THE PLANS OF THE APPARATUS AND INSTRUMENTS OF HENRY COWING.

That they have examined the plans of the apparatus and instruments of which Mr. Henry Cowing claims the invention, and which have been submitted by him for examination.

The several articles submitted by him are as follows, viz:

1. An engine driven by steam, applicable to all descriptions of draught. This engine differs from the locomotives in common use, in being capable of moving and drawing loads upon ground of any description capable of tillage, and consequently upon common and plank roads; in the property of being turned around an axis, passing through its own centre of gravity, and therefore within its own length; in that of allowing its wheels to be geered to considerable differences of velocity, and in all cases to velocities far less than would be given without geering, to wheels of the same great diameter. It therefore appears to the committee that Mr. Cowing has foreseen and applied remedies for those difficulties which would be encountered in the use for agricultural purposes of locomotives constructed upon the usual principles.

2. Gangs of plows to be drawn by the above described steam engine. These are planned and arranged in various manners for the purpose of meeting the variety of operations that are desirable in agriculture. Thus: One of the gangs is arranged for subsoiling; another for cultivating or horse-hoeing plants arranged in rows or hills, and these are so adjusted that they may be shifted in their position so as to throw the earth either to or from the plant, as circumstances may require; a third set is so arranged that a great depth may be reached, and the soil broken up in successive slices, thus allowing the earth to be thoroughly pulverized before sowing or planting; in a fourth arrangement it is proposed to cover seed sown broadcast to an uniform depth, while the soil is at the same time harrowed and rolled.

3. A machine to be worked by the same locomotive, and intended for ditching to any desirable depth.

Your committee are of opinion that all these different instruments manifest great ingenuity on the part of their inventor, and are well worthy of the notice of agriculturists who are possessed of large tracts of land of tolerably uniform surface. It is therefore very desirable that these different instruments, and particularly the locomotive, should be subjected to the test of experiment, by which alone their absolute and relative value can be properly tested.

4. Mr. Cowing also proposes a method of concentrating cane-juice and boiling sugar, which is intended to obviate the many difficulties that attend the manufacture of raw sugar in the open kettles, which are still employed to so great an extent in the plantations of Louisiana. There cannot be a doubt that Mr. Cowing's is very superior to the ancient mode, and therefore well worthy of the attention of planters. How far it might be a substitute for the improved method of heating by steam, or evaporating in vacuo, your committee cannot venture to decide; and in this case, also, they trust that experiments on a sufficient scale may be made by those who are so deeply interested in the production of sugar.

All of which is respectfully submitted.

(Signed,)

JAS. RENWICK, Chairman,
J. M. SANDERSON,
CHESTER COLEMAN,
EDWIN SMITH,

Committee.

NEW-YORK, *September* 12, 1851.

REPORT ON THE COTTON SEED OIL AND SOAPS MANUFACTURED BY WM. WILBUR OF NEW ORLEANS.

That they have examined the specimens of purified oil from cotton seed, both summer and winter strained; of coarse and fine soap prepared from the same material; and the cake from which the oil has been expressed, exhibited by Mr. William Wilbur, of New Orleans. The oil appears to have been completely purified from all the impurities which have hitherto been an obstacle to the introduction of the cotton seed oil into general use. As far as they are able to judge, when thus purified it may be applied to all the uses in the arts for which olive oil and other vegetable oils of similar properties are adapted. It is also well suited for feeding lamps, but at the present season they have not been able to test the property of resisting frost in the specimen of winter-

strained. The fine soap was found on trial to be of very superior quality, and the committee are satisfied that the coarse soap is free from all the offensive and disagreeable properties which are almost inseparable from the soap made chiefly with animal oils. As to the oil cake they have merely to remark, that the use of this article in feeding cattle is no new experiment, for a trade between the cotton growing districts of Asia Minor and the dominions of Austria in cotton seed, to be used for this purpose, is of some antiquity; it may therefore be considered certain that the use of this oil cake, as cattle food, cannot be injurious to the health of the animals, while its nutritious qualities are unquestionable.

In view of the great importance of this subject, not only to the extensive regions in which the growth of cotton is the staple article of agriculture, but to all those where these products are useful, your committee do not hesitate to recommend Mr. Wilbur's processes and products to the favorable notice of the American Institute.

(Signed) JAMES RENWICK,
J. M. SANDERSON,
CHESTER COLEMAN,
EDWIN SMITH,
Committee.

New-York, *Sept.* 12, 1854.

NOTES ON JAPAN.

By R. L. P.

The climate of Japan is very healthy, though in the winter snow is very frequent, and the changes are rapid, and the frosts sharp; portions of the summer, particularly dog-days, are excessively hot. Rains are abundant throughout the year, but particularly in June and July, which are called there Satsuki, or winter months. Thunder and lightning are of frequent occurrence. The seas which surround Japan are rough, and liable to sudden gales; they are filled with rocks to such an extent as to endanger navigation.

The soil for the most part is mountainous and barren, but through the industry of the natives, it has become so fruitful as to supply them with all the necessaries of life; the most rocky and forbiding localities, are made to yield fruits and roots, and at the same time please the eye. By frugality and labor, this populous empire, although surrounded by tempestuous and dangerous oceans, subsists without any assistance from other countries. Even mountains and hills form no obstacle to cultivation, agriculture is in high estimation. The farmer pays a large portion of the produce as rent to his feudal chief, and is restricted to have all his land under cultivation. If any part of it is left untilled, he forfeits the possession of that part, which is immediately taken by another farmer. The principal production is rice; barley and wheat are not much used as food. The rice is placed in the ground in April, and gathered the last of October, or early in November. The steep side-hills even, are cultivated; stone walls are built to support platforms, which are sown with roots and rice; every square foot of the mountains are so arranged

and cultivated. Forests are only allowed to remain where agricultural labor is impossible. Trenches are made use of to divide fields, instead of fences; after certain intervals, these are filled and cultivated, while others are opened, thus giving the land rest. Great care is taken to collect manure, which is made liquid before it is used; this, in my opinion, is the only way manure ever should be used, as no crop can make use of any other than a liquid. The Japanese carry this liquid to the fields in pails, and pour it on the plants when five or six inches high, with a ladle. Weeds are so thoroughly eradicated, that the sign of one is not seen.

The country is well supplied with fountains and lakes. It is subject to earthquakes, which the natives think are caused by huge whales creeping under the islands, and they therefore do not heed them more than we do storms of thunder and lightning, though they sometimes destroy whole cities, and bury thousands of inhabitants under their ruins, as was the case with Jeddo in 1702, when 200,000 lives were lost.

The Japanese mountains are abundantly filled with metals, such as gold, silver, and copper, over which the Emperor claims supreme jurisdiction; no mine can be opened without his consent. He receives two-thirds of the produce of the mines, and the other third goes to the lord of the province. Tin is found there of superior quality, nearly resembling silver; iron, coal, agates, and pearls, are likewise more or less abundant.

A red earth is found in a river of one of the provinces, which is burned in lamps instead of oil. Ambergris is met with on the coasts of Satzuma and Khumano, chiefly in the intestines of whales.

The plants of Japan are numerous. Among them may be named the mulberry, which claims the first place, being the food of the silk-worm, they likewise make paper from its bark; it grows wild. The varnish tree, called by them Urusi, is a noble and useful tree, it affords a milky juice, with which the Japanese varnish all their household dishes, plates, &c.; at court, such var-

nished ware is preferred to gold or silver. The Kus, or camphor tree, is a species of laurel, bearing black berries, the roots and wood are cut into small pieces, steeped, and camphor is made of the decoction.

The tea shrub, tsianoki, is one of the most useful plants growing in Japan, and still it is only permitted to exist in barren places, and around rice fields. The coarse leaves are brewed into a beverage for the common people and laboring classes, and the fine leaves are dried, powdered, and mixed in a cup of hot water, and thus used in the houses of the people of quality. Friends visiting receive tea when they arrive and when they depart.

Sansio is a tree, the bark of which is used instead of ginger or pepper, having a pleasant aromatic taste. There are fig trees, chestnut trees, walnut trees, firs, cypress, bamboos, maple and others.

They cultivate hemp, cotton, rice, barley, wheat, turnips, beans, carrots, melons, cucumbers, and others too numerous to mention here.

Japan is miserably supplied with four footed animals, either tame or wild; they are only bred for agriculture and carriage, and always soiled. They believe in the transmigration of souls, and therefore eat no flesh; they live mainly upon vegetables. They have horses, oxen and cows, but do not use milk or butter. Asses, mules and camels are not made use of. Formerly immense numbers of dogs were bred in Japan; they were not allowed to be abused, and to kill one was a capital crime. They have deer, monkeys, bears, wild dogs, rats, mice, foxes. There are many reptiles. Snakes are scarce. Fowls, birds and insects are numerous. Fish abound in the seas, whales are very abundant, oysters and other shell fish are plentiful and in great variety.

Japan, by the natives called Nipon, which signifies the foundation of the sun, is the same which Marco Paulo, the celebrated Venetian traveller, calls Zipangri. It is a whole set of islands, situate in the most remote part of the east, invincible, and almost inaccessible, on account of its dangerous and tempestuous sea.

It takes a ship from a southern port the best part of a year to make the voyage. There are but few good harbors known where ships of large size may lie, and one is Nagasaki, the entry to which is narrow, and of a dangerous and difficult passage.

The country is populous beyond imagination. A chief travels with a retinue of 20,000 men, an inferior chief with 10,000, &c. The highways are a continued row of villages, joined together by time, forming streets a whole day's journey on horseback, in length.

The Japanese are bold, and have a perfect contempt for life; when conquered by an enemy, and they find it impossible to be revenged, they do not scruple to lay violent hands upon themselves. They are not wanting in proper arms. At a distance they fight with arrows and guns; when hand to hand they use pikes and scimeters. Their scimeters are so sharp that one stroke will cut a body in two; they are not allowed to be exported under pain of death. Water is their common drink. They go bare-headed and bare-legged; they wear no shirts; they have no pillows to lay their heads upon; they sleep on the ground, laying their heads on a piece of wood, depressed in the middle; they can pass whole nights without sleep, and suffer great hardships; they keep themselves nice, and their houses clean and neat. There is a mixture in their blood of the fire and impetuosity of the Tartars, and the ferocity and calmness of the Chinese.

One would naturally suppose that Japan must be an unhappy country, from the fact that its inhabitants are kept as it were prisoners within the limits thereof, and denied all commerce and communication with their neighbors; a country also so much divided, and split into so many numberless islands, Japan is a singular instance of nature's kindness in this respect. These islands are, with regard to the empire, what different countries are with regard to the globe; differing in soil and situation, they produce various necessaries of life. There is scarce a commodity that can be desired but that is produced in some island in sufficient quantity to supply the entire empire. They find gold in Osin, silver in Bengo, copper in Atsingano, lead in Bungo, iron in Bitsju; Tsiku-

sen supplies them with charcoal; the burning mountain of Iwogasima throws out immense quantities of sulphur; in Fifen they have white clay, of which they make all kinds of porcelainware; quantities of wood come from Tossa. Nagatta breeds oxen, Satzuma, horses; Cauga, rice; Tsikusen, chestnuts; Wakasa, figs, and fruits generally; the coasts of Oki afford an abundance of shell fish, and other coasts supply quantities of fish. All sorts of medicines are found among their numerous mountains and valleys, and cereals in many provinces.

The Japanese are superior in the workmanship of gold, brass, silver, and copper, and particularly ingenious in carving, gilding, graving, &c. They weave silken stuffs so fine, so neat, and equal, that they are inimitable even to the Chinese. This is the common amusement of the great men of the Emperor's court, when in disgrace, and banished to certain islands where they have nothing else to do. Their beer, which they call saki, is brewed out of rice; it is stronger and better than that of the Chinese. Their paper, made out of mulberry, is superior to the Chinese, made out of seed and cotton. All their varnished or Japaned household goods are amazingly fine. Their skill is great in the manufacture of varnish, and laying it on. They are found wanting in embellishments of the mind and philosophy, and are entirely ignorant of music, so far as harmony is concerned. They are ignorant of mathematics. They are rather expert in physic, but ignorant of surgery, and make use of two external remedies, fire and the needle. They are particularly fond of bathing and sweating themselves in ovens, which conduces to their general health.

Justice is readily obtained in Japan. The case is laid before the proper court of judicature, the parties heard, the witnesses examined, the circumstances considered, and judgment given without loss of time; nor can they appeal, since no superior court can mitigate the sentence pronounced in another, though inferior. Liberty of conscience so far prevails among the Japanese, that they never condemn a religion, and there are many established in their empire. They profess a great respect and veneration for their gods, and worship them in sundry ways; and in the prac-

tice of virtue, in purity of life, and outward devotion, they far out do christians. They are careful for the salvation of their souls, scrupulous to excess in the expiation of their crimes, and extremely desirous of future happiness. Their laws and constitutions are capital, and observed with great strictness, the severest penalties being put upon the least transgression of any. Without them, such a populous and wealthy Empire could not flourish.

Japan might at this day have been a christian country, had the Portuguese priests or ministers devoted themselves entirely to their calling, instead of interfering with the affairs of government. In the year 1583, Taico, a man of humble condition in life, by his own conduct and merit, raised himself to be one of the most powerful monarchs in the world at that time. He first reduced the powers of all the princes of the empire, whose insolence had become so great that it was almost impossible to control them. He next began to put a stop to the Portuguese interest, and the propogation of the Christian faith, and dying soon after, his successors ordered that all Portuguese, with their clergy, and Japanese kindred, should leave the country; that the natives of Japan should for the future stay at home, and that those who had embraced the doctrine of Christ, should renounce the same, these Christians were persecuted for many years, and the finishing stroke was given with unparalleled cruelty; in one day all the sacred remains of christianity in Japan were exterminated, and thirty-seven thousand christians butchered. Thus the Japanese empire was thoroughly cleared and shut up. The Portuguese afterwards sent over a splendid embassy, of sixty-one persons, all of whom were beheaded by a special command of the Emperor. The Dutch East India Company was made an exception. They had carried on a trade with Japan since the beginning of the seventeenth century, had always been loyal, and taken part with the Japanese against all their enemies. Besides the liberty of trade had been secured to them by two imperial privileges, one of which they obtained from the Emperor Ijejas, in 1611, the other from his successor Fide-Tadda, in 1616.

The houses of Japan are invariably built of wood, never more than two stories high, the upper one being generally used as a

store room; the lower part is all thrown into one large room, and if other chambers are necessary, screens are used as divisions; they have neither chairs nor tables; they eat their food in a squatting position from large basins made of wood or earthen, and having lids; the guests salute each other with a low bow before they begin to eat, and like the Chinese, take up their food with two small sticks; between each basin they drink warm rice beer —this, with tea and water, are the only liquids they use; they take their meals at 8 in the morning, 2 in the afternoon, and 8 in the evening; the women eat by themselves. Polygamy is allowed. The husband is a complete despot. The married women distinguish themselves by painting the teeth black, or pulling out the hair of their eyebrows. The bodies of persons of distinction are burned, while others are interred. Schools generally abound, but corporeal punishment has not been introduced.

The origin of the inhabitants of Japan appears obscure. European geographers insist that they are of Chinese extraction, and relate the two following stories in confirmation. It once happened in China that several families conspired against the emperor; when the plot was discovered, he ordered that they should all be put to death; but the number being so extensive, that the executioners becoming weary of shedding blood, laid the affair again before the emperor, who ordered them to be transported to the uninhabited islands of Japan, and that they became the progenitors of that populous and powerful nation.

The other story is, that one of the emperors of China, unwilling to part with his empire, desired to find some medicine that would make him immortal. One of his chief physicians assured him that such a medicine existed in the uninhabited islands of Japan, —that it was a delicate plant, and would lose its virtue if touched by any other than chaste pure hands—and proposed that 300 young men and 300 chaste young women should be carried over there to collect the plants; they were sent by the emperor, and remained to people Japan. With regard to European nations, we can trace their origin by their language. Thus: The Bohemians, Muscovites, and Polanders are of Sclavonian extraction; the Spaniards, French, and Italians are of Roman extraction; the

Danes, Low Dutch, Swedes, and Germans are the offspring of the Goths. How different with the Japanese language; it is pure and free from all mixtures with the language of their neighbors the Chinese. The Chinese speak three different languages, according to three provinces they belong to, and the native of Japan does not understand either of them. The Chinese set their characters one below the other in writing, without any intermediate particle to connect them. The Japanese do the same, but their language requires that the words and characters should sometimes be transposed, and sometimes joined together by other words and articles invented for this purpose; their pronunciation is pure, articulate, and distinct. The Chinese is a confused noise of numerous consonants, pronounced with a singing disagreeable accent. Their religion is entirely different. The probability is, that they are descended from the first inhabitants of Babylon, who were among the builders of the Babylonian tower.

NOTES ON THE RURAL ECONOMY OF SWITZERLAND.

BY THE HON. N. BURCHARD,

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Switzerland, placed in Central Europe, presents a surface broken by the loftiest mountains, and plowed by long and fertile valleys, through which flow rivers that take their rise in the vast glaciers which lie embosomed in the Alpine regions. These snow-clad elevations have a controling influence on the climate of the country. Their proximity produces frequent and heavy rains, and exposes the whole confederation to biting frosts in spring and autumn, though where the lakes lie, near the Jura and the Alps, the vine yields the most luscious grape. These bodies of water soften the rigors of winter and the heat of summer. In spite of all the disadvantages of a rugged nature, and raw climate, the country teems with industry, and is peopled with a hardy race of men. Every spot that can be put under the plow and be laid down to grass, enters into some branch of rural economy. Even here are vast plains over which herds and flocks stray, that have never been broken by man since their creation; and where the venturesome hunter never trod, the sure-footed goat crops his richest and sweetest food.

This little republic is the land where pastoral life is displayed in all its phases. Though all the cereals growing in similar latitudes may be found strewed over the confederacy, in many districts the plow and flail are not to be seen. How could it be otherwise? There are here chains of mountains that bristle up beyond the line of eternal snows, and the surface of the glaciers, which is double of all the space occupied by the Swiss lakes,

often descends as far down as 4,000 feet. These create pastures fresh and green during the season, and feed the innumerable herds that rove near their icy borders. The Alps themselves are nothing more than a succession of pastures, which vary in their maturity as you ascend their stupendous heights. Hence the moisture and variability of the climate are suited to cattle-breeding and dairy husbandry, but these mountainous regions are not favorable to the growth of grain. There is an extensive plain, beginning at the lake of Geneva and bounded by the valley of the Rhine. Here are found the cantons of Vaud, Berne, Argau, Lucerne, and Thurgau, which are the garden of Switzerland. It must, however, be conceded that out of all the twenty-two cantons of the Swiss confederation, Argau, Lucerne, and Thurgau produce more grain than enough to supply the home market.

The Swiss rural classes are almost universally owners of the soil, and from this cause it is extremely subdivided. And what gives a further attachment to land in this country, is the system which almost everywhere prevails, that each parish holds lands in common, which gives the poorest inhabitant a privilege to cultivate a patch of ground, and cut hay for his cow, the indispensable appendage of every Swiss family. The fundamental principle of the confederation is, to guaranty property and favor its equal division. Though an American will not hesitate to admire the simplicity and frugality of these sturdy, independent mountaineers, yet he cannot but confess that the excessive subdivision of Swiss lands has been highly detrimental to agriculture. The so called garden tillage is bad in many places. Not a good plow nor ox can be seen. The milch cow is put before their poorly constructed instrument, and it will be ten chances to one if the wife does not either drag or hold it. Hence most all the little farming labor is done by female hands; and where this happens, you see no fine houses, no sleek cattle, and no superior farming utensils. Indeed, it is only in the environs of Basle and Zurich that you see *deep* or *subsoil* plowing or drainage done on economical and just principles. Most of the other cantons follow the old courses and usages of husbandry, with tolerable success, but do not keep pace with the technical and experimental knowledge

of the age. If a few highly deserving agriculturists like M. Tellenberg, at his admirable Agricultural Institution at Hofwyl, near Berne, have done much to raise high the standard of excellence, this is the exception, not the general rule.

Land adjacent to the large towns is dear; not a foot that is now under the plow can be bought for a sum less than $500 an acre. But this would be the minimum price; it often exceeds $1000, a league from any large town like Basle or Geneva. Capitalists are content to make an investment at this rate, though they do not obtain two per cent for the money embarked. Real estate is in none of the cantons burthened with heavy taxes, nor are the toils of industry wasted by an idle and profligate nobility. The truth is, everybody here lives within his income, and he deems it a sin to go beyond it. The millionaire that lives on a patrimony descended from a long train of frugal and industrious ancestors, never thinks to trench on his estate, but is deemed a sluggard, or a man of no reputation, if he does not make some additional capital. Drones leave the country and spend their estates in foreign lands. If a Swiss girl at service gets only $25 a year, she will reserve $15 out of her earnings in a savings bank. Hence *failures* are almost unknown in any of the commercial, and much less the pastoral cantons. This is the true cause why Basle, Zurich, and the Valley of the Jura has no beggars, and the eye is greeted everywhere by neat cottages and a cleanly-clad and well-fed population. Among the rural classes, the females belonging to the families of small estates all labor in the field. Many of these simple and laborious maids have a considerable share of beauty in youth, but where the ruddy cheek has faded, the haggard face becomes ugly. It lacks that which will brighten the human countenance with the reflex of its own beauty, intelligence, when impressed even upon the furrowed brow. We do not like to draw invidious comparisons, but can say that the inhabitants who live in the cantons where the reformed religion prevails, are almost known by cantonal boundaries, and they will lose nothing in a juxtaposition with their neighbors, in point of skill, order, and intelligence; but we regret to state that in those parts of Switzerland where the Romish priests have full sway, poverty and idleness stare you in the face.

Let us leave the towns that have a mingled mass made up of Swiss from other cantons and foreigners and go into two of the most fertile valleys in the confederacy. Here is Entlerbuch, or the valley of the Little Simme—one of the rivers that water the Catholic canton of Lucerne; and there is Simmenthal, in the Protestant part of Berne, and one of the most lovely spots in Switzerland. Classic Tempe falls far below the latter in point of beauty and magnificence.

Both valleys are renowned for their fine herds and flocks, and the extraordinary vigor and prowess of the inhabitants. You find in Simmenthal no beggary, and no native but what can read and write. Rich meadows and fat pastures, neat cottages and comfortable barns greet the eye on every side. All wears the appearance of industry and thrift. But winter here reigns with the utmost rigor, and snow falls often and lays on the ground to the depth of twelve feet. Entlerbuch, with a more genial climate and fertile soil, has an army of priests, and many saints and holidays. Ignorance and idleness beset you on every hand. Even the article of cheese, the staple product of the land, is much inferior to the Emmenthaler in another quarter of the same canton of Berne. Everything being equal, the like observation may be applied to all the other Swiss cantons. Where the reformed religion prevails, there knowledge is scattered among the masses; and, on the other hand, where the Roman religion holds its sway, there is no enterprise, no industry. The human mind is fettered down to old customs and usages. In no department is this malign influence more felt than in rural economy. Look at a plow, harrow, or winnowing implement in Lucerne. Why, they are modeled after those that were used by those sturdy and heroic warriors that fought at St. Jacob or Sempach!

We regret to say that in the department of agricultural industry, all Switzerland lays behind the age in the application of modern improvements to its soil, and the introduction of labor-saving machines of recent invention. Even the rural economy in the neighborhood of Basle and Zurich is many degrees below that of Great Britain and even Belgium. The farmers in the country do not even keep pace with the manufacturing and commercial

classes. Be it said to the praise of the latter, their onward progress is truly astonishing. Since 1815 no country in Europe has made in manufactures and commerce more steady and rapid advances.

There may be some apology for the backwardness of the Swiss agriculturists by way of improving their farm utensils on account of the low price of manual labor. A male peasant receives only in summer a franc a day, and in winter 80 centimes (15 cents). The same class among females are paid only 60 centimes (12 cents) in summer, and 45 centimes (9 cents) in winter, board included. There are districts where wages in the field fall below that standard. But it may be safe to put down the wages of a peasant not above the prices just mentioned.

But we are sorry to say that there is another draw back in this country more serious than slovenly and scanty agriculture. I allude to the almost universal habit of the male population among the laboring classes, of resorting to the tippling houses. This is a crying evil throughout the land, and the whole body of the people are so accustomed to spend time and money in this way, that I fear that many years will roll around before this monster will be driven from the land. A tart and inferior wine is drunk in the vine growing districts. Kirschwasser (German, cherry water), a powerful alcoholic liquor is made from the cherry. A fiery liquid is made from grain and cider, and even wormwood, which infuriate and demoralize the rural population. In towns, beer is the ordinary beverage of artizans and day-laborers. The evil does not end here, but it always accompanies tobacco smoking. Beer is retailed at about three cents a pint, and smoking tobacco is not dear—but a very severe tax for a man to moisten his throat and stupefy his brain, who cannot bring to his family a piece of meat only on a Sunday, and leaves them to live on black bread.

Having passed some time in the Swiss confederation, and made frequent excursions through the country both on business and pleasure, I have deemed it not misplaced to lay before my readers my personal observations on its rural economy.

On the outset I will confine my remarks in regard to the cereals. Wheat of different varieties is grown in the cantons of Basle, Argau, Zurich, Thurgau, and Berne. The fine wheaten rolls that we see on the tables of the best class of hotels of the country are not made from the wheat grown in the confederation, but the superior article comes from France, Bavaria, and other lands. The two kinds that are most cultivated are the *bald* and *bearded*. The Swiss farmer prefers the latter variety, because he thinks the plant is hardier to resist smut, rust, and the ravages of insects. But many fancy the *bald* wheat, because its flour makes a whiter loaf. To prepare the ground for the reception of seed, red clover is plowed in early in summer, or some other green manure is obtained from other plants, suited to produce the same result. Stable or barn-yard manure is always put in the preceding crop. This course is thought to shield the wheat stalk from an excess of straw and smut. Naked fallows are not common. The farmer seldom lets his land rest, and by frequent changes of crops the same object is attained, by manuring and alternating different vegetable productions, so that the land be kept in tillage and grass. I saw nothing in the culture of winter wheat in any of the grain-growing cantons that would do to compare with the wheat fields in some parts of East Lothian in Scotland. The Swiss suffer the weeds to grow among their grain, and they do not keep the soil dry by under-draining, nor leave it mellow by deep ploughing and thorough harrowing. Where winter wheat will not grow, a resort is had to spring wheat, which is far inferior in staple and yield.

From *rye* is made the bread that enters into the common consumption of the laboring classes. Being a more certain crop, and requiring less manure and culture than wheat, it has become a great favorite of the husbandman of the country. Wheat and spelt flour mingled with rye makes a wholesome and agreeable loaf, but the latter grain will produce bread that lasts more than a week in summer, and double that time in winter. Many peasants add to the rye dough cooked potatoes, when the latter bear a low price in market; this is thought to impart to the mass softness and sweetness. This plant delights to strike its roots in

the sandy soil of the Rhine and its affluents. It is sown in August and harvested in July next succeeding season. You can see fields of it on the slopes of the Jura, and even in the Alpine regions. The same mode of culture will hold with regard to it as the last preceding crop. There are varieties of this grain sown in spring, but the return is greatly inferior to the winter variety.

The *many-stalked rye* (secale multicaulis) has found its way into Switzerland and Wurtemburg. In both countries it is sown either with *spring rye* or oats, and when they are harvested it is mown down in August for fodder to be given to neat cattle, more particularly milch cows, which is said to add greatly to the quantity and quality of the udder. This kind of rye yields a fine crop the next year, and is harvested about the same time as the other kind.

Spelt, or German Wheat, (Triticum spelta) is quite common in parts of the confederation. The red variety is preferred. It is less delicate than wheat, and can resist frost and its natural enemies better than many other cereals. It thrives best in a rich porous soil, and it is very often mingled with rye, hence the operation of sowing is alike. The seed ought not, in northern Switzerland, to be deposited in the ground later than the first of autumn The spelt field ought to be rolled the next spring, kept free from surface water, and to prevent lodging should be grazed. The Swiss make a gruel and soup from this grain.

The farmers have among them another variety called the *Little Spelt*, that grows on poor stony or gravelly soils. The straw is a first rate article to tie up grape vines.

The common or two-rowed Barley is grown to a very limited extent in this country. The Swiss Cantons have but very little barley lands. Though much is used in the country for malting, the demand is supplied from the neighboring States. I have seen a few fields of the six-rowed barley, but the former kind has come more generally into use. As grain for bread it is here seldom cultivated. Barley is generally sown after naked fallow or some green crop. A farmer would be very content to raise 35 bushels on an acre.

Nampto barley, a native of Asia, seems now to be a great favorite of the farmers; it requires a rich and mellow soil, and demands less than twelve weeks after sowing to come to maturity. It should be sown in rows or drills, and never broadcast; should this be done the yield is very small. Its stalk is succulent, and gives fine food for milch cows. There is still another variety called the Little Barley; this plant is very tender, and is easy nipped by frost. As a green fodder it has few superiors, particularly for early green horse feed.

Oats are more generally cultivated than any cereal in the Cantons. The Tartary oat holds the first rank; it grows in poor foul land, where other grain fails. The potato oat is the best variety raised, and enjoys a high reputation. There is a black oat cultivated in the mountainous regions, but teamsters avoid it, and say when given to horses it provokes heat. On the whole as a crop it is badly managed, and in favorable years it will not produce on an average over 40 bushels an acre. Switzerland having a great transit trade requires a heavy consumption of grain for horse and mule keeping; it is a great pity that the different Cantons do not take measures to improve the culture of this valuable cereal.

Maize is grown in the rich valley of Loantino, in Tessin, the most southern Canton in the Confederation, and patches may be seen in Vaud, near Payernne, and in the valley of the Rhine. The Indian corn is not grown here exclusively for the ripe grain, but its young stems are given to cattle for fodder. It is a very inferior plant to what we see in the valley of the Mississippi. Its stalks seldom reach more than five feet, and the Swiss matron can give you no delicate and sweet roll or delicious *Johnny cakes*.

Millet is cultivated in some parts of the country. The *Polish* and *common*, or German, grow north of the Alps, and the Indian that requires more heat, in Tessin. The poorer classes employ it as a substitute for rice.

Among leguminous plants cultivated as food for man or cattle, peas and beans are well appreciated by gardeners and farmers

of the country. Of the former the green pea, the large yellow and white, find the most favor. In good olden times no garden was without a patch of this nourishing and wholesome pulse, which, together with beans and haricot, in some shape found its way on the daily table. The introduction of the potato and coffee plant had greatly diminished their production. We are sorry to see this nutritious, palatable diet fall into disrepute, and yield to exotics less suited to support the physical and mental powers of a working man. Their mode of culture in this region is nothing remarkable, and in quality and color are much inferior to those that grow on the river Thames in Canada.

They grow vetches, with clover and oats. With the latter, peas enter much into the composition, and as green food they are highly esteemed in dairy husbandry.

Buckwheat, grown in artic and temperate climates, is very scantily raised in this land. While this plant is flowering a cold wet storm often destroys the hopes of the husbandman. The crop fails so often to come to an average yield the farmer hesitates to sow it. As a green manure it is cut down at the height of twenty inches; it stands deservedly high. The grain is nutritious, and greedily devoured by the domestic animals, but seldom made an article of human food.

Clover, both *red* and *white*, are great favorites of the farmer. Mineral manure is scattered on the red clover, and where soil and climate favor, it grows luxuriously, and I have known it mowed four times during the season.

White clover grows often on perpetual and natural meadows. It has a sweet and flagrant smell and taste, on the declivities of the mountains. It feeds swarms of bees, and gives that sweet and aromatic flavor to the grass grown on the head waters of the Soane, renowned for fine butter and cheese.

Lucerne grows in the mild regions of Switzerland; it thrives best about the lakes of the country, and a meadow of it can be kept from 10 to 15 years, and when mown before it is in full

bloom it makes admirable hay for the horse, and can be taken several times in the season from the soil.

Among root crops, the potato holds the first rank. This precious tuber is found wherever any other plant grows in the wilds and mountains of the country. The best varieties cultivated are the Rhenish bright red, the yellow round, having a rough skin, and the blue potato. They are all found good for the table, but vary in quantity and quality. For food for cattle the Swiss grow some crosses that originated in Holland and England. They are planted by hand, though some farmers use a plow to make a furrow, in which the tubers intended for seed are dropped. The old plan of cutting the potato, or planting a small inferior tuber, is among enlightened cultivators abandoned. This valuable vegetable is liable to three peculiar diseases, which have destroyed whole crops and almost created famine in extensive districts, since the inhabitants are not supple, and cannot shift from one course of husbandry to another, but hold to old usages and customs with a tenacity that is truly astonishing.

I do not think it amiss to give a little sketch of these diseases. The *rust*, *frizzle disease*, and *dry rot*, are the most formidable and destructive; the last is very dangerous, because it strikes rapidly the soundest tubers. The rust is known by brownish spots on the leaves, which wither by degrees and at last perish; then the disease sinks below into the roots. And then comes the *frizzle disease*, or in the language of the country, kraupelkrankheit, because the leaves of the plant become crisped and dry up long before the potato ripens. The effluvia coming from such a growing crop is very offensive, and the tubers small and few.

The *dry rot* is characterized by the hardness of the tubers. They cannot be cooked, and are good for nothing. This malady arises from a sort of fungus that springs up in the interior of the potato. After a while it invades the whole substance. The *savans* of Germany and France have put forth some very plausible theories relative to the causes and remedies for this terrible disease, but their learned disquisitions and experiments have not proved of lasting utility to the farming community. To arrest

this calamity, a precaution ought to be taken that the potato vaults be kept very clean, and even whitewashed, and the bottom be covered over with sand mingled with ashes; for a very fine dust arises from the dry rot and fastens on the sound tuber, and affects it. So a new crop can in a short time become valueless from this stealthy but poisonous agent.

In order to render its ravages less, the plant should be put in a soil the best adapted to its growth. None but pure and well formed seed should be used. Let it be put in the ground in the proper season, and never expose the tuber too much to the sun's rays. A diseased potato should never be suffered to lie on the farmer's premises; no, not even to rot on a dunghill. For a further precaution when the disease prevails in any country, it is recommended to place the tubers destined for a new crop, in dry boxes and dip them in lime-water; to plant them when dry and well aired.

Beets of every variety are found in the country, except in the mountains, or where soils are stiff and stony. The sugar-beet is not raised here, as in France and Germany, for the manufacture of sugar. The larger varieties, such as the mangel wurtzel are raised for the feed of cattle; the smaller and more delicate kinds enter largely into culinary uses. The leaves of beets are chopped and mingled with hay or straw, and given to milch cows. The roots are stored for winter use, and found admirable for fattening cattle.

Turnips in general do not give a fair return, but still in the valley of the Inn, very fine ones grow, that will rival those which are raised in England. There are two modes of cultivating the turnip; the one in rotation on naked fallows, which yields very abundantly; the other after the spring or winter crops are removed. This, at best, is a very lean return even for the little labor bestowed. But the culture of turnips in general is slovenly and faulty. It is seldom they receive a top-dressing of valuable manure. Bonedust is hardly known, and there is a great antipathy among the Swiss farmers against night soil, though by a simple process it can be rendered inodorous and a powerful stimulant for this vegetable.

There is a variety of the turnip which is quite a favorite among the Swiss cattle-breeders; I allude to the ruta baga or Swedish turnip. No root crop is better for milch cows, or yields finer or richer food for fattening neat cattle. In this line, the potato and mangel wurtzel are inferior. The plant in its infancy struggles against bugs and worms, which are very destructive.

Cabbage does not form a prominent branch of gardening in the Helvetic Confederation, nor is it grown in the open fields, as in France and many parts of Germany. The leading varieties raised for sour-krout are the Sugar-loaf and the Monmouth white cabbage. The latter has a beautiful white color, and is very delicate. The lower leaves when turned yellow are stripped from the plant and given to cattle. Even the stalks are not wasted, but also converted into food; but then they are in general mingled with hay for the purpose of economizing and making the food palatable for the domestic animals. There is a singular custom in the country, after having severed the plant from the soil, to heap the heads up and leave them a few days. This process is thought to add to their color and taste.

The oil-bearing plants are not extensively cultivated in the Swiss cantons. The Colza might be grown in any of the grain-growing parts of the land, but it takes no stand among the products which are raised either for home consumption or foreign market. Rape seed is less common. Flax, however, is raised for its oil and textile qualities. Good flax is grown in Thurgau, and on the great plain between the lakes of Geneva and Constance. But the last staple is found on the Great Emme, near Burgdorf, in the canton of Berne, where it is manufactured on a large scale. The fabrics coming from the Swiss loom in this line, are very creditable to the taste and industry of the country. To understand how to handle the distaff and draw the thread from the spindle is one of the great feats of female economy, and what is more, the wives of millionaires at Basle and Zurich pride themselves on making the linen for their household. Oil made from flax is an important article of commerce, and the cake, the residuum after expressing the oil, is excellent food for cattle. It keeps them fat and sleek. The mode of preparing the fibre, and

the operation of converting the raw material to a fabric, presents nothing new, but in the main it is behind the age. Nor could it be produced at all but for the low price of labor. For instance, an ordinary day-laborer in the flax, is content with 90 centimes (18 cents,) a day, and his hale and grown up daughter would think herself amply compensated if she should receive for the like time 60 centimes (12 cents) a day, at the loom or spindle.

Where the last described plant will not thrive, hemp, a hardier vegetable, is grown. It is a profitable crop for the farmer who dwells on the border of the river Aar, and patches of it are scattered here and there over the more fertile parts of the Confederation. Great precaution is taken to procure *pure* seed, and in order to obtain it a seed plat is surrounded by fields of potatoes or cabbage. The great utility of this plant for the manufacture of cordage and coarse cloths is well known to the reader. As an oil-bearing plant it falls far below the colza, or flax. I would further observe, that *water rotting* is forbidden as a measure of sanitary precaution, hence dew rotting obtains every where, on grass. Great pains is taken to produce an equal *rotting*.

The poppy is also cultivated here and there, especially near Argau upon the Aar, less for eating than the extracting oil for table use.

White Mustard may be seen occasionally here and there, but it is far from entering into general cultivation.

The *Hop* is grown considerably in the Canton of Thurgau, and also in the other Cantons. The staple is quite ordinary. The flower has a rank smell and flavor.

The culture of Tobacco has taken place in the Canton of Vaud, near Payernne; the staple is of good quality and of excellent flavor; very good segars are made from it. Patches of tobacco of inferior growth and reputation are strewed over the Confederation. As the Swiss are great consumers of this plant, and it is mostly manufactured in their large towns, there is a heavy importation from Grand Duchy of Baden and the neighboring

States, even it is brought into the confederation from the United States and West Indies.

Wormwood is grown in Mutiers, in the canton of Neufchatel, for distillation. The liquor mingled with brandy forms a powerful beverage, and under the name of absynthe it finds its way in all the first class of hotels, and even is sought for in France. Many Swiss and German taverns keep the article in the United States.

Tinctorial plants have not as yet found their way in the Swiss course of husbandry. France sends a vast quantity of madder and mead, and other dyeing plants, into the confederation. The duties being so extremely low in Switzerland on foreign dyes and stuffs, where labor is so much cheaper, it would be hard for the natives to compete with foreigners in these raw materials so extensively consumed by the large manufacturing establishments of the land. Dye-growing plants are, notwithstanding, cultivated on a limited scale here.

Time would fail me to speak of *medicinal plants* which are found in this land, but it may be safely asserted that no country in the temperate zone is richer in aromatic and medicinal herbs than this country.

The general culture of good fruit abounds in the cantons of Basle, Argau, Thurgau, Zurich, Salenn, Berne, Vaud, Geneva and Tessin. The manufacture of cider is very extensive in Thurgau, and some parts of the other cantons. Many of these cantons abound in fine apples, pears, cherries and prunes. Kirschwasser is the great staple of the Swiss peasantry, and I am sorry to add, one of their most intoxicating drinks. The cherry tree is found by the side of the walnut (Juglans nigra) strewed over the fields. The fruit of the former presents a great variety and excellence, and the soft-shelled walnuts form the dessert of the poorest peasant, and even from this valuable nut he expresses a very good burning oil. The fig tree (*Ficus carica*) grows well at Basle and Geneva as well as the peach and apricot (*Prunus Armeniaca*), while Tessin blooms with the citron, orange and pomegranate

trees. Dried fruits are made more than needed for home consumption.

Switzerland exports on an average annually 45,000 quintals in cereals, dry legumes and peas, and 5,000 more quintals in tinctorial roots, medicinal herbs and dried fruit.

Vines.—Many thousand Swiss in the cantons of Neufchatel and Vaud owe their subsistence to the culture of the vine. On some favored spots, such as the southern declivities of the Jura and the Jarot, which produce the *Cortaillod* and *Boudry*, *La Vaux* and *La Cote*, though not equal to the choicest wines of France, yet are wholesome and well flavored. They approach the Burgundy, and the sparkling bottled wines made in the environs of Neufchatel are a very good substitute for Champagne. Luscious grapes for the table grow in many other places. The aroma, or perfumery, in many of the wines rival almost that of Burgundy. The vine dressers prefer the White Rissling, Red Klevner, Black Burgundy, Red Inamin and others, and from these are produced the best wines of the country. The wines that are made on the Rhine and the Lake of Constance are weak and insipid; they all smack of malic acid. There are fine vine yards in the valley of the Rhine, but below Basle. As to the method of planting, trimming and training the vine I have to observe, that in French Switzerland it is kept as low as possible, hence it ripens sooner and improves the wine in flavor. Wine is a considerable article of export from Vaud and Neufchatel, and even Thurgau sends large quantities into the bordering cantons. Good wine is made in the Engadine, or valley of the Inn, also in the valley of the Rhone, where the exposure and inclination of the ground are favorable. Much tart and insipid wine is made in the Swiss confederation; the vintages there often prove ungrateful; and it is a singular fact, that there have been only three very favorable seasons for the vine dressers the last fifty years. Wines made from the vintages of 1811, 1834 and 1847 will command almost a double price. The wines of Tessin are, like those of Italy, not remarkable for their flavor, and can only be kept for a short time. Switzerland sends annually about 46,000 gallons into

foreign countries, and the vintagers of Thurgau, Neufchatel and Vaud export large quantities into the different cantons.

The Mulberry tree grows well about Lugano, the valley of the Rhone, and on the plains of the Grisons. The breeding of silk worms is confined mostly to the latter canton and Tessin. The mode and process of treatment and culture are far from being perfect.

DAIRY HUSBANDRY.

Switzerland justly prides itself on its immense capital invested in the domestic animals, and their produce is a mint for the cantons that may be termed purely pastoral.

The Swiss horse is stout and clumsy. He yields in every point except power of endurance to those noble animals that we see at New Market, in London, or in the immense stables of the King of Wurtemburg. The cantons of Schwytz and Frieburg make some pretensions to rearing a race of draught horses that are quite a favorite in the other cantons. About 3,500 find their way yearly into foreign markets for military purposes.

In the rearing of neat cattle the country has reached a high position; but as excellent as its cows and oxen are, they look inferior in size and form to the improved breeds, such as the Devons and Short-horns, the delight of the English graziers, and introduced here and there in our country.

The most perfect type of a Swiss cow comes from the varied and beautiful valley of Simmen, in the Bernese Oberland, which presents the most luxuriant pastures and charming meadows in that romantic country. This fine specimen of the bovine race has light brown hair, unctuous and yellow skin, short horns, bright eyes, dark muzzle, large head, heavy dewlap, deep brisket, broad chest, straight back and loin, but her hips are narrow and her neck is monstrous. What is strange, a cow of this sort, when encumbered with a large sweeping dewlap, though not a superior milker, will frequently command $80 in market. I have known them to fetch even more.

There is as much accounting for the taste of the cattle-breeder in over-looking this fault in his cow, as the Valaison who doats upon a wife deformed by the goitre, yet both have their admirers. The male, in shape, beauty, and strength, falls far below the fine-limbed and deep mahogany colored Devon, with his clear, elevated horns. The purest type of the Simmenthaler is very rich in cream and of a fine yellow color.

The cows of the valleys of the Saone, in the cantons of Frieburg and Emmen, in Berne, from whose fine udders flow the milk that makes the well-known Gruyese and Emmenthaler cheese, have a large long frame. Their fore and hind quarters, together with the head, neck, and tail, are very dark, the rest of the body white. There is another race in the canton of Appenzal, the pied cow, which is very much admired for dairy purposes. These are all of the larger races, and from them spring the heaviest cattle for the shambles and rank the highest for the cheese manufacturer. To these breeds may also be added the strong and muscular working cattle of Soldebrunn, teams of which lend a charm to that landscape. There is a smaller race of cattle in the canton of Schweitz that give richer milk for butter, and is better adapted to the climate, soil, and grasses that grow about the mountains. There is also a little cow in the valley of Hasli, the region near the head waters of the river Aar, that on the score of economy for the mountains, far surpasses all other races of neat cattle. She bears an enormous udder, and her milk will make, according to quantity, the richest cream of all the different races of the country.

It may be safely set down that the Swiss cows are very excellent for dairy husbandry, particularly of the hardier mountain breeds. The large towns throughout the country are well supplied with good pure milk, at a reasonable rate. Indeed the prices do not vary between summer and winter.

In the environs of the cities, and on the plains, the cows are constantly stabled the year round, except about a month before winter sets in, when they are set at liberty to rove over the mea-

dows; whose surface is not divided between the adjacent owners by fences, but the animal is kept on the domains of its owner by a cowherd, who constantly attends them. Green grass is always kept in the manger during the season, and meal and root crops are mingled with the hay when the animal is stabled. The cows are kept in warm and comfortable stables, where much attention is paid to their cleanliness, and much economy is used in saving the liquid manure, which in the German cantons is called mist wasser; this is not very judiciously applied to meadow and pasture grounds. It is only in the Alpine solitudes where the cow roves over varied pastures, and feeds on rich and aromatic herbage from May to September. Even here each proprietor has his little Alps, mountain pasture over which his herd is allowed to graze. This enchanting ground is where the cowherd blows his horn, and the ruddy and sunburnt milk-maid sings her *Ranz des Vaches*, but the Oreodes, or mountain nymphs, are only in the imagination of the poet. The *chalets*, or cowherds' quarters, in which cleanliness or comfort can seldom be found, are strongly constructed, in order to resist the Fon, the hurricane which sweeps along the flanks of the Alps, and the heavy bodies of snow which entomb them in winter. It is all sheer poetry about neat cottages dotting the Swiss mountains, or that all the inmates lead a happy and contented life: they are almost as rude as our Indian wigwams, the inmates are filthy, and live on coarse and scanty food, principally made of a little black bread and hard skimmed-milk cheese that requires an ax to cleave.

Cheese has been from time immemorial, the staple commodity of the valley of the Great and Little Emme, and the Grucyere on the Saone. These samples of Swiss dairy-industry do not fall short of the high standard of excellence awarded to them in the home and foreign markets. There are cheese-vaults at Summiswald, that hold the article that has been deposited a century. Those that manufacture cheese in the Emmenthal have attained great perfection in producing a rich, highly flavored and portable commodity, that is sent to the ends of the earth. The best Grucyere is as rich as the *Stilton* of England, or the Brie of France, and is so much esteemed by the independent makers as

to be kept for their own family consumption. There is much poor skimmed-milk cheese made and consumed by the poorer classes. The Schobzieger cheese is prepared from skimmed-milk powdered in a mill, and mixed with salt and the leaves of *Mellilot trefoil*. The canton of Glarus produces this very fine article. Switzerlands exports annually over 110,000 cwt. of different kinds of cheese.

The butter of the country has a fine flavor when made by clean hands, and the utensils employed are sweet and free from foreign matter; and I am happy to say, that in the plains the Swiss housekeepers are very tidy, and will serve you up some delicate and nice dishes.

It is in vain to look for good luscious butchers' meat in this quarter; they work their oxen, and even cows. Their meat is always tough and unsavory. Veal is their best meat, but not white fat and juicy, like that we see at Paris and London. The exportation of cows and oxen from Switzerland to the neighboring States, reaches 45,000 head annually. Heavy droves of cows go every fall to Lombardy from the Swiss mountains. About 5,000 calves are sent abroad during the same time, from the shambles. Goats abound in the mountainous districts; they crop their food on the most dizzy height, and are the poor peasant's profitable companion. They give a rich milk, which is converted into cheese and butter, and their young kids are very nutritious food. Their skins are a very valuable article of domestic trade and foreign commerce; no skins for grain and uniformity, surpass them. They ascend to the highest parts of the mountains, to the very verge of perpetual frost, and the limits of vegetable life. They love to perch on lofty peaks, where no human foot can follow. There is no class of mountain laborers more exposed to danger than the goat-herdsmen. Their wages are reduced to the smallest pittance, indeed they dole out a miserable existence, not being even supplied with the indispensable necessaries of life. They live and sleep almost constantly in the open air, and go month after month without eating a morsel of even the hard and ill-flavored flesh of the old goats. To rescue the young and giddy kids, that wander sometimes from the main flock, and clamber up

crags, they slide down into yawning abysses, from which they never arise.

Then on the flanks of the Alps, both herdsmen and shepherds encounter frequent mists and fogs that completely shroud the mountains, and make any steps taken by man or beast highly perilous. Nor is this all. When the fearful tornado drives along the sides of these high mountains, cattle become frantic, and in the disorder they rush headlong down precipices, and will not listen to the call of their keepers. The goats will also disperse, and although less exposed to slide and fall than neat cattle, yet they are frequent victims to their rashness, and their young falls often a prey to the Lammergeier, or lamb-vulture.

It is safe to put down the amount of goats in Switzerland to about a half million; the annual exportation of kids for the neighboring markets in Lombardy and France, at about 3,000 heads. It is supposed about 10,000 goat and kid skins are sent abroad year after year, beside their home consumption is immense. It is a very prolific animal; the female bears usually twins. They are the most hardy of all the domestic animals of the country. Heat and cold little incommode them. They will crop the most bitter and even poisonous plants, and feed on willows, the juniper, and cranberry.

I am sorry that I cannot give a very flattering account of the sheep-husbandry of the Helvetic Confederation. It is enough to say, they have only two breeds, the native coarse-wooled sheep, whose staple would in any country be deemed a very inferior article, and then you will find here and there a flock of the Flemish breed. The latter have a finer fleece, but it will take the third rank below those fine ovine races found in Saxony or England.

For the last century the Swiss have made but little or no improvement in this line of husbandry. This comes entirely from want of enterprise, and a dogged adherence to old exploded ideas of rural economy which is carried even into cattle and sheep breeding. Switzerland abounds, as we have said, in the finest

and most diversified pastures in existence, and there is no good reason why it should not grow wool enough for home consumption, and why their natural shrewdness and providence do not lead them to produce fine-wooled sheep instead of the long-limbed, flat-sided, and big-bellied coarse and long-wooled one. I need not be asked about the quality of the mutton. It is sufficient to say, that it is tough and unsavory. The lambs are barely tolerable for the table. A delicate and luscious saddle of mutton is almost unknown in the land. The country is thought to have 600,000 head of sheep, and sends annually into France and Italy 10,000. In some parts of the country, the milk of the ewe is converted into cheese. Many flocks of cattle and sheep are sent from Lombardy into the pastoral cantons to depasture during the fine season, and pasture grounds are rented to these foreign proprietors at a very reasonable rate.

I can say as little for the hogs of the country as I have said of the sheep. There are two breeds, the large and small. Both are types of the most inferior races. In the canton of Tessin, they range the mountains and feed on nuts. On the plains they are mostly kept in styes. Their mode of treatment and manner of fattening present nothing remarkable, but everything belonging to the porcine race is about on a footing with the long-wooled and slab-sided animal that gives no great attraction to our yards.

The truth is that the Swiss have not made great progress in agriculture since the close of the last century. Rural economy is a means of subsistence, and capital does not seek this channel of industry for profit. Land is truly dear, and seldom offered in market. The country is also subject to long rains, and often the hay and grain rot in the field before they can be cured. Then tremendous freshets inundate the land, mountains frequently slide down from above and ruin villages and destroy whole fields in a moment, and glaciers now and then break asunder or push down the valleys, and cause by accumulation of water being suddenly let loose, immense damage. In fact, the Swiss is eternally at war with the elements. Much valuable land might be reclaimed from forests, lakes, and morass. And we think much

valuable pasture land might be put under the plow. There is no reason why agriculture should lag behind the other great branches of industry, and nothing but prejudice, and a dogged adherence to old customs and usages, can prevent this glorious and free country from taking a high position in rearing the best races of domestic animals, and covering her valleys and mountain slopes with the choicest cereals.

LANDSCAPE GARDENING.

BY AUGUSTUS HEPP, LANDSCAPE GARDENER AND ARCHITECT.

Much has been said and written about Landscape Gardening; and in this country the writings of A. J. Downing have done something towards improving the taste for natural beauty, and the embellishment of country residences; still it seems to me that comparatively few have a just appreciation of the true principles of the art.

Generally it is thought that curvilinear roads and paths, scattering trees and shrubs at random, without regard to their habits, height, &c., avoiding straight lines, regular forms, &c., suffice to accomplish all that has been recommended by celebrated writers and experienced men. Nearly all attempts, based upon such a supposition have resulted in disappointment, and at most have not, perhaps, elicited a more gratifying expression than that they were "very pretty," which, in my opinion, is very moderate praise, considering the many natural advantages with which Providence has blessed this country, containing so many charming spots, which invite us to stay and rest at a moment when the physical man feels most inclined for exercise, while before us is spread a lovely panorama, with its flowering shrubs and lofty trees, Flora's lovely children gathered in clusters on the border of groups near the road, leaning and hanging over mossy rocks by the side of a murmuring brook, the more attractive by their manifold dresses.

Nature distributes picturesque scenery all over the globe, and provides for every part, according to its climate, soil, and other local circumstances, a different Flora, and never places a plant where it cannot prosper, or is not appropriate to the character of the

locality. She adorns the summits of mountains with plants, many of which it would be useless to look for in the plains at their feet. Some kinds she places in low wet grounds, others on rocks, others in deep fertile soils, others in clefts, while others, again, like Viscum album, the Orchideæ, and a vast number of Cryptogamiæ, only grow on the roots, branches, and leaves of other plants.

Though the scenery within sight from an elevated point may be composed of many hundred kinds of trees and shrubs, we find that the principal forms consist of but few. A distance from those masses we see a smaller group of the same species; further on a scattered cluster, less and less in number, until the soil ceases to furnish the substances required for the healthy growth of that species. Nature does not withdraw at once the soil best adapted to the oak, but forms a weaving without any visible boundary. Among those scattered groups we find some of quite a different character, products of a different soil, and in following the same direction we see their number increase, until they become the sole occupants of that soil. Besides those forming the main character, we see other genera or species in clusters attached to the masses, or forming groups of their own, while those of inferior height are gathered along the border of the woods, here and there intercepted by a deep cut, allowing a view into the interior darkness, or are scattered loosely, as if cut off from their associates by some accident, but still covering a patch of their own.

Nature is so manifold, and sometimes so extreme in her pictures, that it would require a volume to describe them. Each, however, is charming, and full of harmony when in its proper place. Where representatives of all sorts are found growing within a limited space, our advice is, not to copy such confusion. It should be remembered that nature does not plant trees, but sows them, and that in cases of such confusion, the winds have thwarted her original designs. Contrasts produced by trees and shrubs of different colors, foliage, &c., are sometimes a valuable acquisition to the landscape painter and the gardener, but it is a mistake to mingle indiscriminately together masses of deciduous and ever-

green trees, &c., simply with a view to display the greatest possible variety. The example given us by nature, for the fancy of great landscape painters, I think much better adapted to satisfy a refined taste, and will grow dearer to us with each returning spring.

Roads.—Nature has neglected to make roads; they are the work of men and animals. Both of them, but particularly the former, aware of the fact, that between two given points a straight line is the shortest, would always make use of this, if they could always see the object to arrive at, or if it were not that many objects often interrupt that line, and oblige them to take another direction. If we wish to be successful in our operations and imitation of nature, we must bear this in mind.

If roads and paths are curvilinear simply because fashionable gardening requires them to be so, without any apparent reason or object for departing from a straight line, either near or remote, it would be better to be without curves. Curvilinear roads are beautiful in their place. When skilfully laid out, and every new turn, or the variety of scenery, or the objects passed by or arrived at, show their necessity and justify them, they can not be too strongly recommended.

Even on a limited scale, art has the means of making such an arrangement as nature would have done on the same extent. We may display quite a variety of forms and pleasing effects, particularly with the aid of trees and shrubs from other countries. But we must not commit the common error of displaying on half an acre what nature would have distributed over several square miles, and overload one spot with points of attraction.

In forming groups, and selecting trees and shrubs for that purpose, great care and a thorough knowledge are required in regard to their normal height, time of maturity, color, and form of foliage, habit in spreading their branches; whether of a light, slender growth, like Gleditschia or Sorbus, or a heavy growth, like Æsculus hippocastanum; even the color of the bark, in many cases, is of great consequence, and not to be overlooked. With all the great variety which both the woods and the nursery

offer, it is not so easy a task as many imagine to group so as to produce a pleasing effect, changing as the spectator moves, and not lose sight of the main thing—harmony, when seen from a distance. This, I believe, is the very point where many fail (if they have succeeded well so far,) in laying out new grounds.

The annexed sketch is not intended as a guide in any particular case, but merely to illustrate what has been said on the subject in general. Location, extent, soil, climate, and many other things of less importance, differ so much, and present such a large field to the landscape gardener, that it would be a useless endeavor, even for the most competent artist, to design anything that could even partially be carried out with success on one place in a thousand.

To make a full selection of trees, &c., for the annexed design, and describe how to arrange them, would take more room than I am allowed; but I will add here a short list of trees, &c., forming the main features, which, in my opinion would, if seen from the proper point, make a charming picture.

Area, about ten acres, supposed to be nearly level. We will enter the grounds at the letter *X*, and explain to the reader whatever should be noticed, as we go along. *A*, indicates the dwelling, 42×42 feet, built in a substantial manner; if painted, we would suggest some light color, such as a warm yellow. On the south side a portico may be added; on the west side of the house, a verandah, 9 feet wide, crossing the carriage way at *w*, leads us to *B*, the green-house, 66×36. On the north side, a gangway, 12 feet wide, is cut off by a partition. The heating apparatus is situated in the center of this. The end towards the house may be used for many purposes not agreeable in the dwelling; the end opposite is for small garden implements, and other utensils necessary for the management of such a place. The part in front of this partition, about 22×66 feet, may be divided by a glass partition into two parts for different purposes, (or any desired proportion,) and heated by the same boiler. The patch of ground in front of this, neatly laid out, with a few choice shrubs, would add to the beauty of the more select flowers. Keeping along the

fence, we come to a row of beds, for plunging Ericas, Azaleas, &c. These beds may be five or six feet wide, and of any convenient length, dug out about two feet deep; having made a layer of brush, branches of trees, or other like material, fill up to about six inches above ground with peat, or such stuff as may be most advisable for the different genera. To give it a neater appearance, a frame may be made around the bed, which will give facilities for shade and turning off heavy rains by means of shutters. *E*, forcing or propogating house, 15×40, span roofed; useful also for other purposes. *F*, range of forcing beds; *y*, a crossing over the ditch, leading to the manure depository, *q*. *C*, carriage house (provided with apartments for coachmen) and stable, with a poultry house, *D*, attached on the west side, and a covered gateway leading to the manure depository, separated by a wire fence from the poultry yard, *p*. *M*, a water reservoir in the center of the garden, *n*, *n*; *o*, group of dwarf pear trees. *J*, a summer house and observatory on an artificial hill from 20 to 30 feet high; an ice house underneath, with the entrance at *H*. *G*, a roliere; *r*, a rustic seat nearly surrounded by the water of the fish pond, *S*, supplied by a small brook entering at *f*, *f*, on the south side, (running through a grove of Ulmus campestris, or Fagus sylvatica,) and running out through the ditch, which separates the manure depository from the hot-bed, &c.; or the water may be conducted through wooden or iron pipes, underground to some spot in the grove, and come out between some rocks arranged for the purpose.

To lay out and embellish grounds systematically, it is necessary to be acquainted with the locality, extent, shape, natural products, and distant sights, if there be any. After having made a general map of the ground, showing also the position of the house, roads, &c., I design sketches for sections proportionate to the extent of ground, which must be according to general arrangement, shown on a bird's eye view representation of the whole; and so I am enabled to select trees and shrubs with regard to height and tint, which will seldom fail to produce the wished-for effect.

I give here only a list of trees and shrubs adapted for groups on or near the lawn.

South side of house, on the left of the entrance, Fagus sylvatica and Magnolia glauca. On the southwest corner of the house, 3–5, Fagus sylvatica. East side of green-house, Cytisus elongatus and Rosa Boursaltii. Group 1.—Spiræ Reevesii, and 2–3 Cratægus oxycantha, fl. rubra pl. (trees). Group 2, southwest.—Robinia pseud-acacia, Syringa vulgaris, fl. viol., and Amygdalus nana, fl. pl. Group 3.—Robinia pseud-acacia, Prunus Virginianus; next the green-house, Sophora Japonica pendula. Group 4, east end.—Cornus sanguinea, Viburnum opulus; behind, Acerplatanoides or pseudoplatanus. Group 5.—Acer platanoides, Fraxinus excelsior, and Rhus florida. Group 6.—Abies Canadensis. Group 7.—Rosa Boursaltii, Spiræ saliciformis. Group 8.—Ulmus Americana pendula. Group 9.—Rhus cotinus and 2–3 Ailantus glandulosa. Group 10.—Carpinus betulus. Group 11, 3.—Fagus sylvatica purpurea. Group 12.—Acer campestris or Liriodendron tulipifera. Group 13.—Staphylea pinnata, Ligustrum vulgare. Group 14.—Robinia Caragana, Cytisus laburnum. Group 15.—Tilia Europeæ, Fraxinus arnus, Acer negundo. Group 16.—Fraxinus excelsior pendula, Philadelphus coronarius, and a Rhododendron on a rockery. Group 17.—Cercis siliquastrum, Catalpa syringæfolia. Group 18.—Viburnum opulus, Syringa vulgaris, fl. alba. Group 19.—Salix Babylonica. Group 20.—A leaf group of Rheum giganteum.

ON THE IMPORTANCE OF VETERINARY ART AND SCIENCE.

BY CAPTAIN J. C. RALSTON, LATE OF BRITISH ARMY, ETC., ETC.

The vacancy which exists in this country, in relation to that next most important of the domestic sciences, after those of human medicine and surgery—veterinary science—is entire, in any educational or institutional point of view. Its sphere is also very limited, as an understood and practiced art. That this should be so, is a fact equally remarkable and to be deprecated. In the older nations of the world, and in the modern times and countries of Europe, veterinary art and science have been solicitously fostered and promoted, by governments, associations and individuals. If its advancement and cultivation, in those countries, have justly been deemed and found to be of high import and value, how is it that in this great stock-raising country, and among a community already so eminently, and yet more largely so in a progressive sense, engaged and interested in that pursuit, the primary and foundational art and science of mankind—agriculture—the claims and considerations appertaining to this other, so essential and co-relative science, should continue overlooked and neglected? The fact seems at variance with emulative advancement, in all other directions of useful knowledge. Perhaps, it may be not entirely based on that rapid use and spread, and augmentive pressure of daily life and action, which has so much, heretofore, distinguished the rural progress and practical culture of this country.

It is, however, suggestive, and bespeaks promise for early considerations in favor of the promotion of veterinary science, that on the occasion of a report made by a committee of the Legislature of this State, one or two years now past, on the subject of a

State Agricultural college, the forcible and intelligent notice of the members, who composed that committee, appears to have been drawn to the co-incidental claims of veterinary education. Some highly valuable and discriminating observations were engrafted on said report, in relation to the subject matter involved generally, and this in advocacy of State encouragement and support to and for a veterinary collegiate institution. All the governments of Europe, and particularly those of England and France, have promoted this important domestic science, through the same means by which human medicine and surgery have been advanced; namely, conferring on it the influence of State opinion and approbation, and aiding it with grants or endowments.

In the said legislative report, it has been excellently and well expressed and represented, that "the great importance of the science and practice of the veterinary art will be universally admitted; and there are some considerations pertaining to this part of the subject, that seem to call with much force, for the establishment of a State Institution, for the improvement of this art;" that "by the census of 1845, there were of domestic animals in this State: horses and mules, 505,155; cattle, 2,072,330; sheep, 6,443,858; and swine, 1,584,344;" and, that "it cannot but be confessed that the treatment of diseases among domestic animals is not founded on scientific principles, and is too often confided to hands that are neither skilful nor humane; and that it can not be doubted that a careful inquiry into the principles of the veterinary art, would lead to better remedies, and a more rational and satisfactory mode of applying them."

It may not inaptly be observed, that in this State there is an average of about one horse to every five inhabitants, while in Britain there is only one to every twelve or thirteen inhabitants. In France, the disproportion is considerably greater; and in other European countries greater still. But in Britain there are several veterinary institutions, and skilful practitioners of the art are numerously diffused over the rural districts, and in cities and villages; and in France the profession has taken up important ground. Whereas, in the United States, there are so few practitioners, who have enjoyed the means of fundamental and adequate

training and instruction, as to amount almost to nothing; and of schools, or any means of acquiring veterinary knowledge, there is no trace. And yet the import, in every general sense, of this branch of knowledge, is great and incontestable; since, to agricultural and stock-raising communities, the claims it presents are enhanced by its close and immediate relations to the care, improvement, and value of all the domestic animals.

In 1761, the first French institution of veterinary science was founded, at Lyons. The government became soon afterward so impressed with the value and importance of this school, that in 1765 it organized the present leading and eminent college of Alfort, near Paris, on a scale capable of lodging 90 pupils, and having hospital stables for 100 horses, with forges, museum, riding-house, &c. In 1828, the people of France had become thoroughly sensible of the combined services, in relation to agriculture and stock, rendered by these previous veterinary schools, and considering that the farming and pastoral interests of the departments of the south of France, very justly claimed corresponding advantages, it was determined, in that year, to found a college at Toulouse, and which was accordingly carried into effect. In Britain, there are the College, proper, of Veterinary Surgeons; the Royal Veterinary College; the College of Edinburgh; the Veterinary Professorship of the Andersonian University of Glasgow; the Lectureship of the London University, &c.

Of the idea of veterinary departments, to be annexed to agricultural schools, it may be said to be excellent and valuable as an accessory. Sessional courses of lectures, however, in a view to attract and guide to general and right apprehensions of anatomy and physiology, and the rationale of treatment for obvious accidents and ailments of animals, together with demonstrations of the elements of superior structure and form, and analogously the principles and preservation of health; this much would appear to combine all the veterinary instruction eligible for such schools. In Britain, agricultural associations arrange for and secure deliveries of such lectures, in order to promote a general acquaintance with the objects and principles of the veterinary art; but its professed training is entrusted to regular and competent institu-

tions. To these proceed young men by whom the art is intended to be pursued as a profession. To these, also, are sent other young men whom agricultural societies and others may have selected to learn skilful shoeing of horses, in order to settle them, respectively, in their districts, as qualified and professed shoeing-smiths.

Perhaps the structure and functions of the horse's foot, and the principles and practice of shoeing, should be studied closely, not only by the veterinarian and the shoeing-smith, but by agriculturists, horse-owners and farm laborers, generally. Sound conditions of this organ are at the bottom of all the value and full degree of utility of this most serviceable of our animals. The domestication of horses is more artificial than that of any other stock; and this, together with the necessity for the iron defence, the shoe, which protects the hoof but prisons the foot, renders a general knowledge of the right and fit adaptation of shoeing a matter of the most serious moment. The truism of "no foot no horse," is ever to be borne in mind; and the amount of injury and diminished usefulness among horses, caused by unskillful modes of shoeing, it is well-nigh impossible to convey any adequate idea of. The deterioration and loss accruing daily with horses of all kinds, and this at once as regards action, capacity for labor, and co-ordinate value and price, occasioned by contracted and impaired conditions of the fore feet, exceed the deteriorations and losses, whether accidental or incidental, which proceed from all other causes put together. Misdirected modes of affixing the shoes, and neglect of the expansive elasticity of the hoofs, are at the root of all the degrees and stages of this universal evil, the direst foe of horses.

The advantages consequent on the introduction and culture of veterinary science, would prove to be neither limited nor of common account. As a new profession, it would open up an eligible and useful path for many young men; would gradually extend soundly-based information upon those external and internal maladies to which the domestic animals are subject; would bring within the reach of farmers and stock-raisers skilled assistance; would proffer and disseminate better views and opinions

on the preservation of health, and likewise as to general improvements in regard to vigor of frame and beauty of form, with all kinds of stock; would tend to elucidate and instruct as to incidental and constitutional causes of deterioration, together with those dependent sequalæ of hereditary defects, &c., which are to be shunned in breeding and rearing; and lastly, and not least, would teach better facts and truer doctrines in relation to the horse's foot—the right principles of adapting the shoe—and the proper manner of fitting and affixing that inflexible but necessary evil.

Veterinary science also tenders to the student of human medicine, an opportunity for improving his knowledge of animal structure and functions, and likewise for becoming acquainted with the treatment appropriate to animal maladies, and this in a manner so as might not unseldom be valuable to him in his professional career. In many agricultural and remoter districts, the two professions, the medical and veterinary medical, could be often availably combined, and this both to individual and local advantage. The human medical schools themselves, at different times, have derived benefit, both in the enlargement of their anatomical and physiological knowledge, and the improvement of methods of healing, from the inspection of the structure of various animals, and from experiments made on them, both in healthy and morbid states. The many instances of this do not fall within the proper scope of these observations; but it may be admissible to recall that the immortal Harvey, in his famous discovery of the circulation of the blood, which effected a total revolution in medicine, was chiefly indebted to his experiments on living animals; and another familiar fact is that of Jenner's discovery of vaccine inoculation, which has annihilated that frightful scourge, small pox, in all civilized nations.

The claims of veterinary science to intelligent consideration and liberalized estimation, appeal equally to the humanity and self interest of communities. The consequence of causes and effects being confounded and misapprehended, as regards the domestic care of animals, and the treatment of their maladies; of uninformed practices, and unthinking cruelty, of various kinds;

and of erring and wrongly directed opinions and information, altogether; all this results in a vast aggregate of loss, direct and indirect. To instance a case in point, in a general way, it may be related that in 1846, a malady broke out, in the summer and fall, among the horses around the city of New-York, and on Long Island. It mostly, or altogether affected horses being depastured. It was called the horse disorder. Nothing reliable was ascertained, or has been handed down, of the nature of this disease, its causes, effects, or proper treatment or remedy. About 1,000 horses are said to have died in a few weeks. To instance a case, altogether the converse, in facts and inference, a malady which broke out in France, may be referred to. It occurred in the department of the Somme, among the stabled horses, instead of the horses at grass. No one could make anything of the symptoms, or trace the causes; the animals continued to eat almost to the very hour of their deaths; and all methods of treatment seemed to hasten the latter event. Mons. Renault, of the Veterinary College of Alfort, was directed by the government, to proceed to the district, and examine into and report on the complaint. He discovered, from post mortem examinations, that the blood was in a singularly unhealthy condition; and that apparently from this cause, the liver and other of the viscera, the internal organs, were in a very deranged state. This—the absence of acute symptoms and pains—and the peculiar manner of the animals deaths, caused him to infer the disease to be in some way connected with improper food. On enquiries being entered into, he ascertained that the hay and other fodder of the whole district had, in the previous season, been gathered and stacked wet, and that it had become black and mouldy. Mons. Renault deemed this fact to constitutionally account for the malady. He publicly explained the reasons and nature of his opinion; pointed out the necessity for at once and entirely discontinuing the use of this fodder; recommended all bleedings and strong evacuants to be desisted from; and that the best corn and hay should be fed, in moderation, and salt used with the food. From that time the malady began to abate and disappear. Herein, then, is contrastedly instanced the public services which veterinary institutions can critically furnish, on occasions of epizootic or epidemic disorders,

among stock, and the fatality which may attend upon the same, in the absence of all due and competent assistance from authoritative sources.

The introduction and spread of educated veterinarianism, would gradually amend the present mal-practices of shoeing, and reduce the amount of loss which so extensively and widely arises from contraction and foot ailments, and would overturn many erroneous ideas and modes of treatment, which prevail far too usually, in regard to many complaints: among horses, such as mistaking the shoulders as the seat of lameness, in an affection termed "sweeny," when the true seat is invariably in those tissues and articulations of the foot-joints, contained within the hoofs; of an inflammatory condition of the eye, represented as a disease called "the hooks," and for the cure of which that beautiful mechanism, the *membrana nictitans*, is barbarously hooked hold of and cut away, thereby causing permanent uneasiness and irritation to the poor animal, and eventual blindness; the fatal error of administering remedies for colic or spasm, where the malady is enteritis or inflammation of the bowels; and innumerable other fallacies and errors, whether as regards diseases, or in relation to ventilation, diet, general care, &c. Among cattle, and the other domestic animals, equally flagrant misconceptions and practices are prevalent with so-called cattle-doctors and some owners; and all this proclaims the occasion which exists for that better implanted knowledge, derivable alone from veterinary reform, and legitimate sources of scientific and true information.

Perhaps, in no direction more than in that of improved breeding and rearing of stock—and more particularly horses—would reliable and accessible veterinary data prove serviceable and of high account. In all countries, the breeds of horses have been held to be of primary moment, to the welfare of agricultural and all other general interests, and improvements have been solicitously encouraged. In France, the government studs command the utmost attention and care. In England, agricultural associations, and systematic breeding for the turf, have been the main sources of the world-wide character of the horses of that country. It is to the number, and the purity of race everywhere care-

fully studied, in her turf and stud horses, that all the fame and value of the English horse stock is owing.

No description of stock can or will pay the farmer equally well with good horses; but inferior bred animals will never pay. No half, or three fourth, or spurious bred sire, should be allowed in any district. Agriculturists and stock-raisers ought to encourage only thorough-bred stud horses; and since these, in this, as well as other States, are so few—not one for one hundred that there ought to be—associations should be formed for the selection and importation of foreign stud horses, to be stationed in as many localities as possible. No enterprise would yield a better return on the money invested, and it would at the same time result in no common State and national advantages. The turf and the raising of blood, or thorough-bred horses are essentially means to an important end, inasmuch that hence is fostered the systematised breeding of that class of horses alone fitted to improve and keep up the superiority of the general breeds; for to do this requires that a certain amount of the attributes of the higher or purer breeds be blended. The beneficial effects of blood—of a superior race engrafted on an inferior—proves extraordinary. The heavy crest, long forehand, straight or upright shoulders, clumsy head and roman nose, coarse legs, &c., disappear, and elegance of form, increased powers of action, and higher capacities of endurance are bestowed. This country, originally drawing her stock mainly from Europe, and particularly from England, had well laid the earlier foundation of her breeds, and to some extent has continued to maintain the same, both by judicious importations and by breeding many fine thorough-bred horses. But the rapid and large development of agriculture, joined to the also increased demand for horses in the cities, has left the raising of superior animals, as stud horses, quite incommensurate with the occasion for them, and this has led to unregulated and injudicious breeding. Very disqualified and unfit sires have been employed, in consequence of no adequate numbers of thorough-bred horses being attainable, or having been supplied, either by importation or breeding, for the turf. The injury to horse stock from this cause has been very marked and great; and it is a growing evil, which every consideration unites in urging should be corrected.

It is therefore alike desirable and important, that both the imported and native supply of thorough-bred horses should command more general attention; and, above all, that the raising of racing stock should be much encouraged. That especial arena of the blood horse, the turf, has been found to combine the most direct and popular means, to a valuable end, as regards raising pure lineaged stud horses, of superior qualifications. The pursuits of the turf unite the stimuli of sporting emulation; prizes, high prices for young thorough-bred stock, and, last and not least, a patriotic desire on the part of many liberal minded gentlemen, to further through its means the welfare of agriculture, and to lay the foundation of a national breed of horses, eminent for qualities the most valuable.

No country in the world can surpass this, in means and facilities for raising the very finest horses. Every variety of soil and climate abounds, whether for raising the heavier draft horse, or the fleet courser, and the latter in an especial degree. Enough of the dryness and purity of atmosphere, which has mainly conferred on the desert Arab his fine form, compacted tissues, speed, and unrivalled hardihood, is everywhere to be found. The scanty pastures of the desert limit the Arab's size; while here, there is no such drawback, but quite the contrary. The main elements wanting towards the raising, much more generally, of fine horses, is, first, an adequate importation of the right kind of thorough-bred stud-horses; and, second, a national stud book, through which to register and trace native raised thorough-bred stock. Towards this, it is necessary that there be circulated among farmers and breeders, some better information on the principles and profits of raising superior horses, and those analogous laws of structure and form, and health and vigor—the significance of some fixed standard and rules—and this would be followed by advantages of no ordinary magnitude.

An association for importing thorough bred stud horses, and founding a State stud, for the sale and also annual hire of the same, to districts, would confer high public advantages, and would be a most remunerative undertaking. In connection with systematized arrangements for founding such an incorporated

association, other benefits of veterinary information and training could be availably combined. In importing horses from England, whether for general stud purposes, or more exclusively improving the native thorough bred stock by judicious crosses, the very best blood should be obtained; but not the fashionable winner, or near kinsman of some of the "cracks," held perhaps at an exorbitant price. The vaunted Derby or Leger winner may by no means prove the preferable sire; and even less likely so for the sounder character and trials of the American turf, and the right object which should be held in view with all racing, viz., raising horses for improving the general and more useful breeds. Race horses, of the best lineage, with good substance and true shape and action, together with undeniably sound eyes, hocks, and feet—and in a particular manner the latter—should be sought for and imported. Such horses can be selected and bought at reasonable prices; and for this country, it is not bad copies, from not eligible originals, that should be in request, however cried up either original or copy may have been, or be, for saved terms of flying two or three year-old speed, or winning one of the great stakes. It is true and honest horses, of superior blood and form, that are wanted. The need for a hundred—or even two hundred of such horses for this State alone, is very great. In 1836 or 1837, an enumeration went the round of the racing press of England, of the horses which had recently, or within a year or two previous, been taken away for America: Apparition, Autocrat, Barefoot, Claret, Chateau Margaux, Consol, Emancipation, Hedgeford, Luxborough, Leviathan, Lapdog, Margrave, Merman, Norton, Sarpedon, St. Giles, Shakspeare, Tranby, Young Truffle, &c.; and at the Newmarket Houghton meeting of that year, I remember a discussion among some leading racing men, whether the turf at no distant day, would not require to cross the Atlantic for some of the good old stout-running sort again? But these, and some fine horses imported since are quite absorbed, and leave no sufficient traces or impress, from insufficiency of numbers, for that extensive occasion for stud horses everywhere seen, and from the fact that native thorough-bred breeding studs are not enough studied or systematized for the purpose of raising and

maintaining a supply. Yet nothing would be more agreeable as a rural pursuit, or pay better.

Blood or lineage must not be a theme overdone, or ridden as a hobby; but it is an essential truth, that purely blood sires should alone be relied on to improve the mixed or general breeds. Perhaps the instances of two well-known American sires, and the subsequent influence of their blood, respectively, on their descendants, may be practical and in point—Sir Archy and Potomac. The former was not only a first-rate race-horse, but was probably the very best native stud horse that has ever, as yet, appeared. For many years, every race-horse of any note partook of his blood, and his influence on the general stock, particularly of the south, has been of no small or limited account. His lineage was English, and very certified and pure, and this whether his sire were assuredly Diomed, or putatively Gabriel. His dam, imported in 1799, was Castianira, by Rockingham, out of Tabitha, the dam of several first rate race-horses. Diomed was by Florizel, out of a celebrated Spectator mare. Gabriel was by Doremant, out of a Highflier mare, also of celebrity as a dam. Sir Archy, by blood, turf performances, and family connections, stood very high—no horse could stand much higher—and what he inherited he bequeathed. Potomac was also a first rate race-horse, and is said never to have been beaten. He, too, was sired by Diomed. As a stud horse he had some of the best mares of Virginia sent to him. Yet he got no race-horses, at least none of any note, and is represented to have seriously and widely injured the blood stock of that region. And if it be asked, as has been done, why this should have been the case, with a horse of fine form and a distinguished runner—the only reply which can be given is, "Ask his pedigree?" The pedigree of Potomac, as rendered in the Turf Register, is, "Sired by Diomed; dam by Pegasus; gr. dam by Yorick; g. gr. dam said to be very high bred." His actual pedigree was "by Diomed; dam by Pegasus; gr. dam, Nancy Mc Culloch, by Young Yorick; g. gr. dam, by Silver Eye, out of a common farm mare." Young Yorick was not a thorough bred horse, and Silver Eye was a half-bred animal. This accounts for the non-success of this fine horse as a stud horse, and which has

occasioned much debate and surprise. He could not transmit inherent qualities derived from pure blood, because these were unpossessed by him, although transmitted to himself by his sire, in his individual generation. Horses not quite thorough bred, may have fine form, and race, or be very fast. The Rocket Gelding, not thorough bred, was the fastest mile horse ever seen at Newmarket. But it is in the stud that purity of blood tells; and a flaw will act unfavorably for a generation or two, until crossed out by undoubted and pure strains. The inheritance and transmissible qualities of blood, belong inscrutably to lineage, with horses.

PAVEMENTS FOR THE CARRIAGE-WAYS IN CITIES.

BY HORACE P. RUSS.

There is no subject so difficult to treat upon, as the art of road-making, as there is no art which has so many professors, all of whom differ as widely in their opinions as in their mode of construction.

The absence of success in nearly every experiment that has been tried in different cities, may probably account for the unabated efforts of thousands yet to produce the much desired result; and if the contest were confined to practical minds, there can be little doubt, but that the vast sums of money, that are annually expended upon the carriage ways of cities, would be productive of some good, whereas, to the contrary, the expenditures result generally in the discovery of a mode of paving perfectly useless.

To enquire into the cause of such repeated failures, in the same cities and upon the same roads or streets, would promptly meet with the response, that the failure of an engineer to construct a good road or street, is paramount to his removal for ever from that branch of his profession; so that, instead of giving him the benefit of his error, thus affording him the opportunity of avoiding it in future, he is cast aside for some other person, with equally sanguine hopes, promises and theoretical representations, who enters upon his project blindfolded with inexperience, without the possibility of gaining assistance from others, for his method is the child of his own brain and the nourishment from his own mind alone, can raise it to a practical existence.

There is another more substantial, less excusable, and it is to be feared an unchangeable cause for the waste of money upon the construction of the carriage ways of a city, and that cause is applied to those in authority, who select, dictate and employ the services of the constructor. The mantel of political authority, in municipal bodies especially, possesses too often to the mind of the wearer the extraordinary power of endowing him with almost supernatural knowledge upon every subject that may be presented to him for examination; the success and experience of those in authority who preceded him, or their expensive legislative failures are alike disregarded by him; his political victory teaches him but one thought, which is, that the appointing power has selected him as superior in every respect to his predecessor; with the inflation of that thought he rises far above the serviceable opinion of experience, regarding it as dictatorial, and overleaping without distinction all barriers to his self will, determines his own experimental legislative career.

There are many men, of course, to whom this lamentable character cannot be attached, but they are so frequently in the minority, that their opposition only tends to ripen the destructive and increasing obstinacy of their colleagues. On the other hand it would be equally culpable for a municipal corporation, liberally to adopt all the scientific plans, that may be presented to them for the construction of roads or pavements; that extreme would be more disastrous than the former, as it would be ruinously expensive; therefore, as it cannot be supposed that a majority of the members of any municipal corporation can be familiar with the art of road making or any other works requiring mechanical skill, it would be wisely prudent, and not at all degrading or humiliating to their public position, if they were to select from amongst the community such citizens as were well known to be good mechanics and constitute them a special civil standing committee, referring to them for examination and report, all matters which required the experience and judgment of the mechanic.

The study of road making has hardly ceased from the time of Appius Claudius, yet the art has made but little progress to the present day.

The Via Flaminia, the Via Aurelia and the Via Appia are well known in history, and a portion of the latter is still in a state of good preservation.

Julius Cæsar commun'cated from Rome with all the chief towns of his empire—not roads of the same unfinished kind as those used in the present age called "country roads"—but roads paved in the most substantial manner with a superstructure of hewn stone, and during the last African war a road of this character was built from Spain through Gaul to the Alps; that great road or military thoroughfare was followed by others communicating with it, that passed through Savoy, Dauphine and Provence, through Germany, every part of Spain, and even to Constantinople, through Asia, Hungary, Macedonia, and to the mouths of the Danube. These roads, or lines of communication, reaching the shores of the continent of Europe, were continued at corresponding points of the neigboring islands and continent. Sicily, Corsica, Sardinia, England, Africa and Asia were intersected and penetrated by roads forming the continuation of the great European lines. Thus the first paved roads of England were the work of the Romans, but they were uncared for by the Britons, fell rapidly into decay, and it was many centuries afterwards before the strides of civilization marked its progress by the reintroduction of good roads.

In 1763, a short time since when compared with the age of the Via Appia, there was not one good road in any part of England.

The construction of such roads by the Romans, so lost upon the early Britons, while they were adequate to their wants or requirements at that time, can be of no service to the present age except by example of the magnificent and liberal manner in which they were extended, for although a portion of the Via Appia is still witnessed and passed over by the astonished traveller, and quoted by him when he returns home for its extraordinary durability, (having been constructed nearly 2,300 years ago,) it would be of no material or durable service for a modern city in North America, where commercial prosperity and immense traffic demanded a substantial pavement. The large blocks in a climate

where no frost would interfere with their base gave the Roman roads an excellent and permanent foundation; the vehicles which passed over the surface of those roads were chiefly chariots with tires to the wheels of nearly a foot in width; but admitting that the frost of this climate would not interfere with the stability of the blocks, they would present too large a surface without joint for horses to travel upon with safety, and if they did, the narrow tires of modern wheels in such a street as Broadway (the number of vehicles passing through that street in one day being greater than those contained in the whole Roman empire,) would make sad havoc in two years upon the soft face of a Roman pavement.

The Roman roads, with the exception of a monumental fragment, have long since been trodden down by time, but the civilized example presented by the Romans for all after ages has yet to be followed by many cities claiming the foremost rank in civilization. Most of the streets in modern cities are covered with paving of cobble stone—the most expensive kind of paving ever introduced, for repairs are required as soon as construction is completed, and continued as long as it is used.—What must be the cost of a carriage way in a crowded city which was paved with cobble stone twenty years ago, and continued to the present time? If it has been kept in passable condition, the whole cost, if known, would indeed alarm the economist, and if not kept in order, then the loss to the citizens by the inconvenience and difficulty of their travelling over it, the unhealthy consequence of accumulating decomposing matter in the holes; the depth of mud in wet weather, and the choking dust in dry weather, would record a loss much heavier and truly alarming. A cobble-stone pavement cannot be kept clean, for if you remove the dirt you take away that which keeps the cobble stones in their places.

It is asserted that we have lost many of the fine arts known to the ancients—it is a fact deeply to be deplored; and there was a secret power of much more consequence that marked the character of the ancient Romans, but unfortunately has not been wholly preserved. It was their gigantic energy which, without the facilities that abound in the modern world, overcame the most

astounding and almost overwhelming difficulties. If the Romans had possessed the aid of steam and its auxiliaries in combination with their wonderful ambition and energy, Romans would still be the conquerors and rulers of the universe! While we flatter ourselves with the name of an enterprising and fast people—while we band the earth with bars of iron, and traverse its circumference with a rapidity truly wonderful—while we crush the waves and effect an easy and swift passage across the oceans—while we perform in a single day the labor of an ancient year—still are we made luxuriously idle and imbecile by the very means which should impel us onward with increasing energies; for, as the engineer and his assistants sit idly by, while the magnificent engine harmoniously performs its gigantic labor, so watches the world, lost in wonder and admiration, at results thus *easily* obtained. That artificial power which would have made the ancients greater has, by comparison, made the moderns less than they might be, if the same energy had continued in practical force as when displayed while creating that power.

Such wholesale charges may well be doubted when made in the very centre of the scientific world. By an examination of facts easily obtained, they will be most fully substantiated.

Enter a modern city, the walls of which in many parts vibrate with industrious steam engines, so numerous that the very foliage of the scattered trees and the humble patches of refreshing grass are moistened and nourished by the condensation from the surplus vapor, where the inhabitants of that city number half a million, whose chief requirements and almost every want depend upon the steam engine; and it will be proof contrary to the foregoing assertion if five hundred persons amongst that half million can be found who understand the character of the very power upon which they are so dependent.

In a densely populated city the first natural want of its inhabitants is pure and wholesome water, which all the treasure of its government, if necessary, should be devoted exclusively to obtain; and when obtained, the next and almost parallel necessity is well paved streets, which should absorb the attention of the authori-

ties and be produced with all possible despatch. Upon the former blessing (pure water) depends the health of the inhabitants; upon the latter their health in a measure and their commercial prosperity to a great extent; for over rough uneven streets it is difficult for the burdened dray or cart to progress with safety to its load, its horse or its driver. Well paved streets are of importance to the merchant almost beyond calculation; and if every person whose interest suffered in a commercial city through the dilapidated condition of the streets were to contribute but one penny for every hour of time lost by delay, the fund would, in a short time, be sufficient to cover those streets with blocks of gold.

What is the remedy for the misfortune of bad streets? It has not yet been found; but by following up the experiments recently tried in the city of New York, a carriage-way as perfect as can be obtained may be the result. The first and most important step towards the construction of a substantial pavement is a good and permanent foundation; this can only be effectively and surely produced by a substructure of concrete. Many years ago objections were raised against the use of concrete for the base of city pavements, where the streets were closely interlaced a short depth below the surface with gas and water pipes, for sealing the streets with concrete would be dangerously expensive in case of a leak in a water pipe at a high point of grade, as the water from the fractured pipe would (finding no aperture above) naturally follow down the grade, until its accumulation at the lowest point of grade forced a passage laterally; the cost of pursuing such a leak, of tearing up such a length of valuable pavement and foundation thereof, was a plausible excuse for the antipathy to that class of solid and permanent work; but that difficulty was well provided for nine years ago, when the paving of Broadway was commenced between Chambers and Reade streets; the concrete by that method is laid in stripes or sections about six feet in width; each section is separated from the next by a pine strip, six inches in width and one inch and a half in thickness, set on its edge; when all the sections are filled with concrete, the pine strips are firmly held by the concrete, but as the cement sets it contracts, leaving small fissures on each side of the boards for the emission of water

in case of a leak. Another precaution is taken for the easy removal of the foundation, by placing opposite to every house, over the connecting point of the lateral with the service water pipe, cast iron boxes filled with concrete, having, for the facility of lifting them out, two wrought iron ring bolts set equi-distant through them. Nine years of experience has proved that every leak has been discovered through these means over the exact place where such leak has occurred, which could not have been the case had the foundation been of concrete unbroken in its bond from curb to curb. The foundation being thus perfected, a superstructure of rectangular blocks of trap rock (not granite), from three to seven inches in width, from five to fourteen inches in length, and of a uniform depth of four or six inches, is then to be laid thereon, at a right angle with the line of the street if it is a great public thoroughfare; although this mode of laying the blocks will not last as long as when laid diagonally, still the advantages for the sure-footedness of horses more than counterbalances the lack of economy; but the extravagance of this mode of laying has yet to be proved, for by cutting the blocks four inches in depth, instead of eight, as are now used, the blocks will be full on every joint; therefore, when the first surface has been rounded up by wear, they can be reversed, the base forming, at a cost of not more than twenty cents per yard, as good a pavement as the first; that being worn away, the sides, and finally the ends, may be made of equal value as a travelling surface, making from one set of blocks six separate and distinct pavements. This may be considered as the best, most durable, and consequently most economical pavement that can be adopted for the service or use of a crowded thoroughfare.

For lateral streets, where no such continual and heavy travel occurs, the concrete foundation may be dispensed with; it would be an unnecessary expense, as the blocks, cut full at every joint, and six inches of uniform depth, could be made subject to the same change of surface as before mentioned, with the undoubted certainty of lasting much longer.

Some portions of the pavement in Broadway has been an error, and the author of that work is responsible for it—that is, as regards the superstructure, the base cannot be improved upon. Many complaints are made respecting the slipping of horses in Broadway. During every day there are many thousands of horses travel over the surface of that street; the proportion of those that fall to those that pass safely along, with heavy burdens, slack traces, and apparent ease, in an average of one week, will not be more than one in fifty thousand. Careless drivers will make any road dangerous, as a bad carpenter with good tools will spoil the finest material; therefore, the falling of a few poor omnibus horses, incapable, almost, from their infirmities, to stand alone, should not be admitted as evidence against a work, the stability and convenience of which has been satisfactory to the public in every other particular.

A pavement being thus completed, and proved by a long employment of it in a crowded thoroughfare such as Broadway, to be durable, required much more than its construction in a proper manner, to make it successful. It should be watched carefully after it is given for public use, to see that no imperfections present themselves, such as an imperfect block, fractured by the blasting in the quarries. This occurs often. The stone so injured discovers to the closest examination no flaw or indication of being divided; for that which is called a powder shake opens into a seam through the constant vibration of the travel upon its surface; and finally, if the fracture be horizontal, the upper part of the block is dislodged, leaving a hole in the street. This has happened frequently in Broadway. Immediate repairs in such cases are economical.

The removal of the pavement for access beneath it for the repairing of pipes, or the connecting of lateral drains for sewers, should be done with great care; it is easily taken up, but much more difficult to replace than it is to construct it in the first place; therefore the duty of inspection upon such repairs should be assigned to a person whose experience alone has rendered him

competent. A political inspector would be out of his latitude upon this work—even though he would be remarkable as such upon cobble-stones.

The next point is, if possible, more important to be guarded against than the others: it is the watering of the street to allay the rising of the dirt, which neglecting authorities permit to accumulate.

When it is desirous to wear down or polish an extremely hard stone, water and sand are the most successful materials, and friction the most rapid power. Such is the plan adopted by the corporation of any city, when it permits a square block pavement to be watered; for the revolving wheels will polish it as efficiently in one day as would be accomplished by the same rolling power in one month without the aid of water. It may be stated that rain produces the same effect—suppose it does?—and that effect is a detrimental one: Does that advise an artificial scheme for imitation? But such is not always the effect of rain; when it is a gentle rain it is so, for then it resembles the corporation watering pot, which drops just sufficient water upon the surface to compose the dirt into a slippery paste, jeopardising thereby the limb if not the life of all who have the courage to slide across its surface. With a heavy rain the result is different: the surface of the street being free from holes, the water flows rapidly over the well-studied inclination to the gutters on each side, carrying with it into the culverts, or receiving basins of the sewers, the dirt which by the gentle rain is left to scrub and polish the face of the hard trap pavement; the rolling power or friction then acts upon the bare and clean surface of the stone, doing, it is true, more damage than would be done if it were dry—but infinitely less than if it were dirty.

Thus it is clearly shown, that if the best method of constructing pavements for the carriageways of cities should be discovered, there is much yet to be done. First, to follow the energetic example of the ancient Romans, and carry the improvement through all the principal thoroughfares of the city, as fast as the means of

the treasury will admit; for such good streets will enhance the value of all property that faces them, increasing in the same ratio the city revenue if it be required. And the second duty is, when the good pavement is obtained, to keep it such, by remembering its first great cost (for no cheap work will endure), watching its earliest imperfections, and having them repaired substantially without delay.

ON A SUPPLY OF PAPER MATERIAL FROM THE MUMMY PITS OF EGYPT.

BY DR. ISAIAH DECK, CHEMIST, ETC., NEW-YORK.

At a time when the leading journals, and the mass of the reading public of the Old and New World are invoking the aids of their respective governments and scientific investigators to devise some means for remedying the scarcity and increasing price of rags, and those materials hitherto adapted to the manufacture of paper, it is presumed a few practical facts, founded upon the author's experiments and observations in relation to sources of supply of linen for this necessrry fabric, for many years will be acceptable, and ultimately available.

Having been interested and engaged some months in investigating, through all its details, a most ingenious and valuable patent process for the manufacture of pulp and paper from a material hitherto waste, and as abundant as it is effectual, and which, in its present infancy, I can thus for obvious reasons only briefly allude to, I have taken pains to acquire exact paper statistics from the sources within my reach and observation.

A brief summary of these up to the end of 1853 and '54, and upon which calculations for the future may be safely founded, will not be uninteresting here, and prove that the average consumption of paper in the United States, is fully equal to 15 lbs. per head per annum, or three hundred millions of pounds (300,000,000 lbs.) to meet this demand. There are in the States about 800 paper mills at work, consuming 405,000,000 lbs. of rags, the assumed product being 75 lbs. of paper from 100 lbs. of rags, and the imports and exports of the article being pretty nearly equal; the average value of these rags at four cents per

pound, being $16,200,000, (sixteen millions two hundred thousand dollars;) and assuming the present supply of rags to be an average product for years of the imported and home grown, it will, in a few more, at our increasing rate of population, fall far below the actual demand.

Although the importation of rags from Great Britain to the United States, has quadrupled during the last four years, the increase in the demand for paper there for home consumption has been equally great, and must end in their being prohibited for exportation by a heavy duty, if the mother country is to be kept supplied. My tables show that in 1850, there were exported to this country from Great Britain, $30,000 (thirty thousand dollars) worth of rags; in 1852, $54,000 worth, or two and one-half millions of pounds; and in 1853, $150,000 worth, or four and one-quarter millions of pounds; while in England alone within the last two years, the increase in the manufacture of paper has been twenty-three millions of pounds, equivalent to a consumption of thirty millions of pounds of rags.

During a late visit to the West India Islands, I had ample opportunities for noticing the abundance of fibrous plants, and testing their qualities for paper making. I allude to the Plantain, Banana, Ochra, Aloe, Penguin and Dagger grass, and others indigenous to the tropics. The adoption of these *might* answer during a temporary scarcity of rags, but the enormous quantity required, thousands of tons, and their advancing price when once the article is in demand, some of them rising in value in a few weeks over 500 per cent, in their dry state; and plantain, the the most productive even reaching $80 per ton, will preclude their sole use, while some require much labor to collect and bring them to serviceable material for the mills. These lose so much in their preparation, that they cease to be economical, when put into competition with cotton waste, (none yielding higher than 35 per cent, and the average below 15;) while others cannot be profitably bleached, and are fitted only for wrapping paper.

The source of supply of rags to which I would direct attention either of companies or private speculators, is from the contents

of the mummy pits, tombs and catacombs of ancient Egypt; and having been commissioned during a former mineralogical investigation of the valley of the Nile, and an exploration of Upper Egypt as far as Mount Zalora, to endeavor to discover the long lost emerald quarries of that region, extending as far as 24° north latitude on the borders of the Red Sea; to report also practically upon this subject, with the facts recent in my memory, I give you the statistical results which I contributed at the time to "Lo Spettatore Egiziano," an Italian newspaper, published in Grand Cairo, and there conducted with great zeal and ability under the patronage of the late viceroy, Abbas Pasha.

The quantity of mummies still preserved in the pits and tombs in the valley of the Nile from Cairo to Thebes, and in the crypts located in the Arabian and Lybian chain of mountains, appears almost incredible except to those acquainted with those localities.

Their knowledge of a perfect process of embalming (and which the arid nature of the climate tended so much to assist) arising from a religious belief in the doctrine of metempsychosis, and which probably had its real origin in a hygienic necessity, made the preservation of all the corpses of this great people a legal duty from the earliest period of Egyptian history. Even if we carry back its annals only to the period of Joseph's arrival at the court of the Pharaohs, (2028 B. C.,) and close them with the birth of Christ, ancient Egypt appears to have figured as a powerful nation over a period of 2,000 years. Her cities and towns were redundant with a population of 8,000,000 (eight millions) souls. There is everything in modern science to justify the belief that the laws of biology in that remote era underwent no change, and that the average length of life as now never exceeded thirty-three years. The population of the valley of the Nile must, therefore, have been renewed more than sixty times during the twenty-one centuries I have taken as a basis, or in other words, above 500,000,000 (five hundred millions) of inhabitants died and were buried in this fertile land, which combines all the conditions favorable to the rapid development of population.

In assigning this number of mummies to the above period, I have made no reference to those which exist in the districts in the back ground, known by the name of Ethiopia (from Siene to Moro). That country, covered with magnificent ruins, and politically separated from Egypt as an independent State, was, nevertheless, inhabited by a race possessing nearly the same origin, religion and the same customs as those of the lower part of the basin of the Nile.

Neither have I accounted for a period of at least 500 years which must have preceded the arrival of Joseph in Egypt, which even at that time was covered with magnificent cities, and inhabited by a people highly advanced in the arts and sciences, (testified to by the erection of the great pyramid of Cheops or Seamphis, at Memphis, 2120 B. C., and the elegant workmanship in glass, porcelain, enamel and metal pertaining to objects found in the tombs and mummy cases of that period,) facts which could only have been the results of a certain number of centuries of existence. Nor has any calculation been made for the two or three centuries which elapsed after the birth of the Savior, when Christianity having become the religion of the majority of the people, the custom of embalming the dead ceased. There has, therefore, been omitted from this approximative estimate a quantity of mummy cloth, which would be fully equivalent to a third part of the above mentioned amount.

These premises being laid down, there remain certain questions not difficult of solution.

How much of this linen cloth is available for paper manufacture, and what is its make and value above the cost of collecting it?

The quantity and quality used varied with the expense and style of embalming, and during the period of 800 years, of the zenith of prosperity of Egypt, embracing two centuries anterior to the exodus of the Jews, to the invasion of Sabaces, 800 B. C., the art of embalming had been carried to the highest degree of perfection, and the finest specimens of mummies and architecture are to be found within that epoch. The former can be distin

guished by the gorgeousness of their outer cases, the peculiar wood (sycamore) and the remarkably delicate texture of the linen; and samples of the latter, which I possess from the collection of my late father at Cambridge, and who, enjoying the early friendship of Belzoni, was enabled to procure a small but *recherché* cabinet of Egyptian antiquities, will bear as much comparison with the finest modern French cambric, as the latter does to bobbin lace.

At this period of sepulture it is by no means rare to find above 30 lbs. weight of linen wrappings on mummies; one from the collection of Mr. Davidson yielded, when unravelled, nearly 300 yards, and weighed, when bleached, 32 lbs. A princess, from the late Mr. Pettigrew's collection was swathed in 40 thicknesses, producing 42 yards of the finest texture. She was a highborn dame, of the royal line of Pharaoh, and it may not be *mal apropos* here to remark upon a curious physiological fact which I believe few oriental antiquarians are cognizant of, that the mummied daughters of the true house of Pharaohs are to be invariably distinguished from plebeian priestesses and belles, by a characteristic natural arrangement of teeth. The four incisors or cutters being replaced by bicuspides in each jaw. This is a proof of their hereditary consanguinity; and it is well illustrated in an elaborately decorated mummy of a damsel now preserved in the library of Trinity College, Cambridge, and whose hieroglyphics identify her as the veritable smuggler of Moses. Other similar peculiar organizations are not unfrequently referred to in modern pathological researches, as indicating descent from particular clans in Scotland and Ireland.

From the graphic accounts furnished by Herodotus, B. C. 450, and four centuries after by Diodorus and Pliny, and subsequently verified by careful researches and examinations of travellers, eight pounds may be assumed as the average weight of serviceable linen to each mummy; this will give a result of over two and half millions of tons, sufficient to supply the demand of the United States for fourteen years without any import from other countries, and it is reasonable to conclude that at the expiration of that period scientific research will have sufficiently developed resources

which will confine the use of rags to a mere admixture with other bases.

The supply of linen rags would not be limited to the mummies of the human species alone; independent of that obtainable from this source, a more than equal quantity could be depended on from the mummies of the sacred bulls, (symbol of Apis,) crocodiles, ibides and cats, which last animals occupied a high position in their domestic theology, symbolizing the various phases of the moon in the pupil of the eye contracting and expanding. They were highly cared for by a body of priests ordained especially for their service, were most bountifully fed on a small species of catfish, (silura, or slyfish,) and when dead were spiced, embalmed and swathed in a superior quality of linen, potted in earthenware jars of quaint feline shapes, and deposited in sepulchres prepared expressly for them at Sakkarah. (Vide Dr. Abbott's collection in this city.)

The crocodiles were equally carefully provided for, being tongueless alive, they were deified as the emblem of mystery, the most salient feature of the Egyptian theology, and were ornamented with ear rings, bracelets and anklets, and when defunct were swaddled in enormous folds of bandages, and consigned to their special sepulchres at Maabdeh and Manfalout.

The spoliation of the tombs of the sacred bulls at Dashour has been steadily progressing for years, in order to procure bones for animal charcoal for the sugar refineries in Lower Egypt at Sarut, and it is not unusual to daily witness scores of camels laden with their remains wending their way to the factories for its preparation, where being charred it is successfully employed in clarifying the juice and syrup, and it is not unreasonable to suppose, from their proximity to the human mummy pits, that cargoes of these latter bones are frequently substituted, and with similar success. The quantity of the cloth stripped from these animals is enormous, and in excellent condition, and is either left at the pits or used as fuel at the factories, while the supply still remaining *in situ* is beyond calculation, and could be secured at a trifling cost.

The quality and value of this linen for paper making is beyond dispute, for although the ancient Egyptians were unacquainted with this art, and relied, influenced by a religious idea, for their supply of writing materials upon the leaves of the nilitic papyrus, cut into sheets and cemented together by pressure, an historian as early as Abdalatif records that "the Bedouins and other Arabs despoiled the mummies of their wrappings, and sold them for the manufacture of paper," and some specimens of delicate cloth from the tombs of the kings at Thebes, dating at least 1800 years before the Christian era, I have caused to be manufactured into bank note and writing paper of the finest but toughest material and texture, and some coarser fragments found in nearly equally ancient mummies, and evidently substituted by the embalmers between the folds instead of finer cloth (proving that the system of "cabbaging" is not of modern date) makes a paper of "single or double milled" cartridge kind, equal to that of the most recent rags; and as the Egyptians were but imperfectly acquainted with the art of dyeing, except in the piece, and then only in primitive colors, and not at all with the art of bleaching, the pulp can be readily got up to any degree of whiteness and strength. The latter may be judged of when I state that some bandages, from five inches to five feet wide and nine yards long, have been stripped from mummies their entire length without tearing.

For the important purposes of papier mache the coarser kinds of fragmentary rags may be used with great advantage. Indeed, so well is this property known to the Arabs always in attendance on the traveller, that they supply him with a sort of impromptu pulp from the boiled and beaten rags, to take impressions of the hieroglyphics from the monuments; when hardened they can be rolled up in sheets for transport and future reference. As an instance of the sharpness and correctness which the close fibre of the material yields, I enclose an impression of a signet ring, with a Persian proverb in Arabic characters, obtained from a tombstone in lower Egypt, which, when reduced to the necessary size for engraving, was readily translated by the late Dr. Lee, Professor of Oriental languages at Cambridge.

The superiority of linen to cotton in the manufacture of paper need not be pointed out, and it is fortunate that there can be no admixture of the inferior article, the Egyptians being acquainted but slightly, if at all, with the latter; indeed, so rare was it that no mention is made of it by the earlier historians I have quoted, except Pliny the elder (not always accurate), who states that "the cotton plant (the gossipium arboreum or Sea Island long staple of our Southern States) was cultivated in India and Upper Egypt, and the fabric produced from it was used by the Egyptian high priests as an article of clothing, but was always looked upon as a rare and expensive stuff." We have proof of this in the paucity of cotton fabrics in Dr. Abbott's valuable museum of Egyptian antiquities now on exhibition in this city, and which comprises every variety of textile and fictile manufacture of this interesting people, and many other unique and valuable articles, from the period of Abraham's visit to Egypt, four hundred years after the Mosaic (not geological) deluge, and during the reigns of all the Pharoahs to the period of five hundred years after Christ.

Hemp was not unknown to them, but, curiously enough, it was of that kind, hitherto supposed to be indigenous to New Zealand (the phormium tenax), but even this was of comparative modern date, and the only sample I have myself verified was a wick from an earthen lamp from the tombs of Sakkara, twelve miles from Cairo, which the characters impressed on showed to belong to the Ptolemaic period.

The question of "will it pay?" may be readily answered by assuming the value of the rags to be from 4 to 6 cents per pound; in the United States this is considerable under the market estimate of fine linen rags; the cost of purchasing, collecting and transportation would be under 3 cents, while on the other hand the substances used in the process of embalming would be far more valuable than the swathing envelopes; aromatic gums of the rarest and most expensive qualities, and such as are now used in preparing the costliest incenses for the high ceremonies of the Catholic Church, I speak of olibanum, labdanum, issoponax, ambergris, &c. These and other resins of an equally rare species, were employed in embalming the superior class of mummies, and

can be readily separated from the animal remains and the cloth, by solution and distillation; while the varieties of bitumens, employed in the inferior mummies, could be made equally serviceable for varnishes, illuminating and machinery oils. At the same time the animal remains can be manufactured into soap (they are too dry for glue or gelatine); the alkali or soda necessary for the purpose, existing in abundance in the Natron lakes, (the *nitre* of Herodotus) through Lower Egypt, and the bones are convertible into animal charcoal or guano; and it must not be overlooked, that the bijouterie relics and antiquarian curiosities, including the winged orb, a mythological emblem of silver, about the size of a half dollar, which is *invariably* placed over the embalming incision in the flank of *each* mummy, would have some nominal, if not intrinsic value, amongst collectors, and their sale would tend much to indemnify any disbursement, that it would be found necessary to apply towards further excavations.

It is presumed there would be little difficulty in obtaining the sanction and co-operation of Said Pascha, the present vice roy, who is far more liberal minded and speculative than the late bigoted and sensual Abbas, or his predecessor Ibrahim Pasha. The railroad across the desert through the Red Sea must be assisted by the resources of the country, and the projected canal in a similar direction, has already received the warmest political, though not financial support. Moreover it may be predicted as a certainty, that England, anxious to preserve from future contingencies her high road to India through Egypt, will have this country, now under the rule of the sultan, ceded to her as the remuneration of interference in the present war and the cost of capturing Sebastopol, and retain it as a British province; and its first step will be to develope the natural and artificial resources of the country, so eminently fitted for enterprise.

The remnants of mummies alone in the vicinity of the pits on both sides of the Nile would begin to pay already without much searching for whole subjects, and indeed so numerous are they in some localities out of the usual beaten tracks of most travellers, that after the periodical storms whole acres may be seen stripped of the sand, and leaving fragments and limbs exposed in such

plenty and variety that the wanderer would be impressed with the idea that he was in the studio of a Frankenstein, in an extensive line of business, and the lamented Warburton expresses with much gusto that "the erratic Frank at his impromptu breakfast, may boil his coffee and cook his kid steak over an aromatic fire kindled with the spiced bosom of an oriental princess."

While in some of the museums of the principal cities of the world we possess such numerous and indestructible records of this great people, we can well spare to employ what is merely a tithe of their relics now rotting in the ground in the manufacture of the important article of paper; and though myself an enthusiastic devotee to archæology in all its bearings, and unwilling to despoil this fascinating science of some of its choicest gems, unless the requirements of the age demand it, I think it not *outré* on the imagination to predict that a Rosseau, Abelard and Heloise of the next generation may transcribe their amorous epistles on "ivory satin," once the chemisette enveloping the bosom of Joseph's fair temptress, or a sheet of the "New-York Times" be issued on the indestructible shroud of Moses' fairer (Pharaoh) stepmother.

The above statistics as to the supply and value of this material, sufficient for demand for many years, are given upon the most correct and lowest basis, and they were endorsed by others, at the period I previously published them, whose opportunities for observation have been far more extended than my own, and I have recorded them in good faith as to the ultimate success of an undertaking both novel and antiquated in its character; and those who would at the first blush carp at and condemn it as fabulous in its application, may, on investigation, be constrained to admit that in this utilitarian age affected prejudice must give way to the necessities which the mass of society demands; and repulsive as it may appear to the over sensitive, it is entirely shorn of this feeling when viewed with the anticipated famine of paper material looming up in the distance; and I would ask them whether it is not preferable to employ clean and sound linen wrappings from a virgin mummy to the dubious rags collected from the

loathsome persons of the Lazaroni who swarm the quays of the chief seaports of Italy and Spain, and are equally the pest and annoyance of travellers in the interior, and from which source more than four-fifths of the present raw material for paper is obtained.

The various dates I have given on the most approved authority of Scriptural and Oriental research. Considerable discrepancy may be observed between these and the dates assigned by those who accept the Septuagint version of the Scriptures, but I have preferred to gather the crumbs fallen from the chronological tables of those luminaries, whose names are as eminent in the pages of theology as they are in the annals of antiquarian lore.

I have samples of the wrappings and paper which I shall present to the American Institute, and shall be happy to afford further personal information.

ISAIAH DECK, M. D.,
113, Nassau street, N. Y.

March, 1855.

SHIP BUILDING.

BY JOHN W. GRIFFITHS, OF NEW-YORK.

To the Trustees of the American Institute:

GENTLEMEN—It was with pleasurable surprise that I received the intelligence of the determination of the Board to embody in this volume of Transactions for 1854, a paper on the subject of ship building, and not less surprising was that clause which informed me that I had been selected as the honored instrument for so distinguished a service.

It is also gratifying to know that you have given me the largest liberty for this important service. I should not therefore intrude upon your kindness, and occupy too much of your space, and, as a consequence of this conviction, shall only give a synopsis of the present condition of the art, in connection with such of its future wants as may be deemed necessary to render its progress commensurate with that of other branches of constructive science.

If there is one department of scientific knowledge more than another which demands an investment of all the energies of the mind in the mechanical world, it is that of ship building. In every other art the majesty of science holds out the sceptre of progress, and new achievements are the result; while in ship building, traditional knowledge broods over the productions of philosophy, and the regal mandates of hereditary wisdom withholds the sceptre of improvement, and sets bounds to the widening orbit of genius, beyond which it cannot pass. The pulsations of mind upon this great subject bear the impress of nationality in every maritime country; and in every age of the world there

have arisen those who, by geographical position, or by love of adventure, have engaged in maritime pursuits. And whether we push our inquiries into the years of antiquity, and take a historical picture of the Sidonian ship yards; or at a later period watch the movements of the founder of the English monarchy in his determination of the advantages of long vessels over short ones; or in our progressive march witness the folly of Spain in the construction of short ships of war with great depth—a practice not entirely obsolete even at the present time—we shall discover that science and practice are inseparably connected with success in this complicated art. Almost from time immemorial the English government has been regarded as the exponent of national advancement in ship building throughout her widely extended territory; hence it is no marvel that her maritime laws should be regarded as the best, and that they should be incorporated with the march of commerce in other lands; but it is surprising that the United States should (notwithstanding her intuitive inklings after the customs of the Old World) have the largest commercial list of vessels on the Globe!

If the geographical position of the United States were only commensurate with that of England, their form of government must render them the arbiter of commercial destiny. But we should endeavor to investigate this important question by the light of mechanical rather than that of political or geographical science, and in doing this we must go back to the time when the United States were colonies, and only recognized as such by England, or take a more remote position, at a time when the Spanish galleons of the Armada exhibited the folly of constructing ships of war with more than two lines of bristling batteries, and taught the world a lesson in the consequent loss of that memorable fleet, which should never have been forgotten, in the consequences of disproportioned depth.

But let it be remembered that pride and ambition take the royal road to science, and, as a consequence, we find the same characteristic significance in the number of decks of admiralty flag ships, as though the power or security of a fleet consisted in the attitude of frowning bulwarks. It requires but an ordinary share of intelligence to discover that if, from the laws of flotation,

they had failed to learn that such ships would be the first in the fleet to be disabled by stress of weather, if exposed to the violence of the storm; the laws of common sense were fully adequate to teach this lesson. In every subsequent age of the commercial history of England we find the same incongruities protruding through the vessels of the time. By the influence of the East India Company the laws of admeasurement were adjusted to the satisfaction of that great monopoly, which has been the fruitful source of more disaster than every other. As contagion spreads by contact, so error widens the orbit of its influence by imitation, and the same heterogeneous code of anomalistics are found in the American navy; its enormity, however, is less apparent in England than in the United States, consequent upon the apparently less rapid march of improvement in the country's marine. The legislation of England which gave laws for the measurement of vessels adapted itself to the wants of this great monopoly, regardless alike of the wants of commerce and of security to human life. It was upon this hypothesis that the tonnage laws found their significance—that inasmuch as the armed portion of an Indiaman was not adapted to commerce, it should not be measured; and from this law has arisen more loss to life and treasure than from all other laws connected with maritime pursuits, and although England at a later period improved her laws of admeasurement by legislation, the United States are still holding out the same false beacon to the mariner, by offering a premium to the owners of unsafe ships in the difference between the real and apparent bulk of vessels sanctioned by law. The wants of the two countries, it might be naturally supposed, would be the basis for such estimate of the size, and peculiarities in the forms of vessels, as might be called for, and while in England the pride and strength of the nation is her navy, in America the national bulwarks of defence are found in the merchant marine, which (under a wholesome tonnage system), in a brief period, and at a moderate cost, may be rendered more formidable than the combined navies of the world, because the size and form of the vessels are more nearly adapted to the necessities and exigencies of the country than those of the government are found to be. This disability arises from two causes;

first, the government or the officer assumes that a commission in the navy necessarily implies an enlargement in the amount of knowledge in mechanical science; and second, influence takes the place of wisdom. It is, perhaps, to a very great extent consequent upon experimental ship building that the United States is indebted for her enviable position as the first nation on the globe in the utility and symmetry of its vessels, and yet, the best informed ship builders in this country will not hesitate to say that ship building is but in its infancy.

Whatever may have been the prevailing opinion relative to the wants of commerce, nature's law of utility is the best yet discovered for the construction of ships. We may, however, be allowed to suggest that utility may not be found in the principal dimensions of a vessel, or in the amount of cargo she may be able to carry above her nominal tonnage, nor yet in mouldings and ornamental externals, as is too often assumed. The great and most important quality in ships has been almost entirely overlooked. If we are asked in what utility in ship building consists, we might safely answer, fitness for the purpose and proportion to effect the object designed; and still, what have we learned from this definition of utility? What do we know of all that pertains to the perfect ship? We see her as a thing of life, laud her design, and yet are unable to examine the index of her qualities. Where is the index of perfection? Who can tell? Are ships only built to enrich the owner at the expense of human life. It would seem so when we consider the long list of disasters which make up a large proportion of the news of the daily press. We seem to regard it as a matter of necessity that both calm and storm should furnish victims for a watery grave, and yet we hear perfection spoken of in the art of building ships. So little is known of the science of ship building that the best and most appropriate locality for any single point in the long catalogue of geometrical focals, has never yet been discovered. It is a truism that those who know the most of the science of ship-building have only learned that they know but very little, and yet they never could have arrived where they now are without the aid of practical knowledge. How often have individuals

discovered that after days and months of study upon the best locality for a single point, which is supposed to be the key to all the rest, does the student find that a change in the position of one power by an alteration of the model, destroys the appropriate determination of all others. Thus are we chagrined at the boasted improvements of this improving age in ship building, and our animadversions on the incongruities so manifestly apparent are regarded too often with the most chilling indifference. This want of sympathy in the mass of mankind to the dangers of the deep may, to some extent, have arisen from the dissimilarity to that of any and all other sciences, in its effect upon the mind of man. The mass of mankind are not content to allow those engaged in the construction and management of ships to know which is the best shape, or what are the most appropriate proportions to accomplish the object designed; hence we say that every man has the imagery of what he regards as the best shape for a ship delineated on the pupil of his eye, and the moment his eye falls on a vessel he is ready to pass sentence of condemnation if the ship, and picture, and his eye do not agree; and in this manner public opinion is manufactured, so that every man has either an opinion of his own (or that imbibed of another) upon what constitutes the well formed ship. We find this pride of opinion in almost every man we meet, and in every association; and those whose business it is to furnish protection and security to life and property are alike imbued with the same malady. No other art is encumbered with this incubus to so great an extent, and yet none should be more entirely free from its influence. Few can see its deteriorations in the construction, but all may witness its baleful consequences in the management of the vessel in time of danger. In common with this multitudinous mass of opinions delivered we cannot forbear giving our own views, which may be yielded as a right or regarded as a privilege, we are not particular which. With regard to the attainment of perfection in ship building which many discover in the ships of the present time, we would say that we regard the dangers of the *seas* as far less hazardous and to be dreaded than the dangers of the *ships*. The community assume, by common consent, that the ship having the largest amount of timber and fastening in her construction is the

strongest, without reference to her shape. A m n tr sity of the largest calibre in mechanical science, a greater error in the mechanical world could not well be proclaimed. The world assumes that because a ship is built in a certain locality, or at a particular place, she must be all right, or that because she will secure an insurance of the highest grade that she must be what she is insured to be. A most egregious error. The world absurdly measure the safety of human life in ocean travel by the number of *boats* on board of the vessel, and are more anxious to secure an act of Congress to compel the use of a certain kind of boat than they are to secure the use of the best constructed *ship*. They are content to allow the ship, with all her treasure, to founder at sea so they can but save the boats and passengers. They legislate for the boat unmindful that the *same appliances would save the ship*. If a life boat is an improvement, would not a *life ship* be a greater one? We propel the ship by steam, but seem to forget that the same power is equally efficient in working the ship and protecting her against disaster by fire, flood or collision. We seem to forget that every vessel lost by shipwreck is the annihilation of wealth to the amount of her value, and too often attended with the loss of human life, the value of which numbers fail to express.

The ocean is the world's highway, upon which all may travel; hence there should be a community of interest in adding to the means of safety of those who travel upon it; and all information in reference to smoothing its rugged pavement, should be hailed with pleasure as a universal blessing, and the *Maury* who shall map out its acclivities, will ever be regarded as the world's benefactor. But what shall we say of the ship, which has been regarded as the model of perfected art. Alas! the philanthropist may weep and wonder at the long list of disasters which mar the page of its history; he may pause in amazement at the selfish design that would, under the garb of philanthropy, seek an appropriation from the government to forward an interest in the protection of property, at the expense of human life. We jeopardize nothing in announcing that, which we believe in the light of science, is a self-evident truth, viz, that *ocean travel may*,

and should be, the safest on the globe; and in order that an achievement so well worthy the latter half of the 19th century may be accomplished, we shall announce a catalogue of requirements as the precursor to the induction of a glorious era of safety to human life. Let Congress appoint a committee of practical men to frame a wholesome code of laws for the admeasurement of vessels, such as could be rendered available as an international tonnage law, and the time for the meeting of the committee to be during the recess of Congress; and let the law of 1852 for the safety of travellers on steam vessels be referred for revision to the same committee; next let the ship owner refrain from a truckling policy, which calls for *cheap* ships, assuming that the cheapest ship is the best, instead of that taught by experience, which shows the *best* to be the cheapest. Let the board of underwriters appoint mechanics instead of superannuated shipmasters as surveyors; and in train, let a Marine Architectural Institute be established by an act of Congress, or become a State institution. The necessity of such an organization will hardly fail to be understood when it is known, that first class mechanics in nautical mechanism are much more rarely obtained than seamen of similar stamp; and although there is an abundant supply of those who are ready to assume the condition and receive the pay, there is not more than one in forty who can render the service which belongs to the character. The necessity of a school of Marine Architecture will be rendered still more apparent when it is remembered that the developments of neither scientific nor yet practical knowledge are within the reach of patent laws, and as a consequence, the exclusive benefit of progressive science is not the property of him who makes the discovery.

Any improvement in the model of vessels is common to all; can it then be a matter of surprise, that the model of ships is not rapidly improved? Whatever discoveries may have been made by the practical man, will not be known until an opportunity is afforded him of developing the same, and, if that opportunity is never afforded him during his life time, the improvement dies with him. Then again we have the ship owner (whose mechanical perceptions are generally obtuse) to oppose improvement in models, and if he suspects that the vessel upon which an improvement is proposed would carry one bale of cotton less by its intro-

duction, he will oppose the improvement, and tell the builder, that he must have the carrying capacity, even though the vessel did not sail as fast or perform as well; and if the builder dare take the responsibility of departing so far from the last model, (unless dimensions absolutely demand it) as to render it perceptible, it would be difficult to satisfy the owner, that every long voyage was not consequent upon the change of form; and, unless some great genius in nautical mechanism shall arise, whose private fortune shall enable him to make improvements at his own expense, the progress of improvements must indeed be slow unless a school of marine architecture shall be established. And although the ship builders of the United States have much to complain of, as barriers to improvements, they have still more in Europe, as we have shown. Let us not boast of perfected art in ship building, so long as unspeakable *dread* attends the ocean traveller, or while sea sickness destroys the appetite of the passengers and makes them selfish and unsocial, and renders life itself to them almost a burden. Away then with the idea of having attained perfection in ship building, nor let the induction of steam in ocean navigation lead us to suppose that we have accomplished all that can be done; that, having crossed the ocean within ten days, we have reached the altitude, or highest grade of progress; let us remember, that our sailing ships have attained greater speed than our steamers, and that the law of progress will furnish increasing speed, and consequent safety, inasmuch as they are inseparable. By the law of depreciation we find, that the American line of Atlantic steamers have lost 3 per cent of speed, since their induction, and that the English line have lost 15 per cent during the past year, showing the superiority of American models;—but, is this a time to fold our arms at the *lulaby* of *perfection*, when the shrieks of shipwrecked sufferers come to us from a thousand shores, and death from collision, fire and flood, are sounding daily in our ears. Our ships should be *life boats* on the largest scale, and we *may* realize within the next five years, that, for passenger travel a single week is sufficient to ensure the greatest comfort in connection with the greatest safety, in crossing the Atlantic, and that sea sickness is a disease, for which the ship builder has the only antidote.

IMPROVEMENT IN AMERICAN TELESCOPES.

NEW-YORK, *March* 13, 1855.

To the TRUSTEES OF THE AMERICAN INSTITUTE:

GENTLEMEN—Your favor was duly received requesting an account of improvements in telescopes lately manufactured by me; you will find annexed description of two telescopes, one being medium size, the other the largest I have finished up to date.

I regret not being able to offer at this time the account of performance of the Equatorial, now being finished for the Michigan University. This instrument is the largest for which I have received an order, being 12½ inches clear aperture, 16 feet focal length; it will be mounted the present month.

It is unnecessary to add anything to the description annexed, except to state that the 9 inch is not considered quite perfect at present, and it will afford me pleasure to add a full description of its perfective performance in time for your next year's report, if desired.

Respectfully yours,

HENRY FITZ.

NEWARK, *February* 23, 1855.

DEAR SIR—In reference to the performance of the achromatic telescope furnished by you with an object glass of 6⅜ inches, it affords me much pleasure to say that it has given entire satisfaction, and from a happy combination of good material and skilful finish, it transmits the most delicate light, and gives a correct image. It will bear high powers in a good atmosphere without showing any trace of prismatic color, and still preserving the dis-

tinctness of the image. Powers as high as 1,000 are sometimes used with advantage. It gives a sharp outline of the brighter planets. I have frequently observed Saturn in the autumnal mornings before daylight, the season when the atmosphere is most propitious for nice observations, and remarked the sharp and distinct figure of the planet, and the division of the double ring, showing in addition a marked subdivision of the outer bright ring, also the interior ash colored ring, with other and more minute points of interest.

In dealing with close double stars the performance is equally good, showing a dark line of division between the components of such stars as Epsilon Arietis, Epsilon Equlei, Zeta Cancri, and Zeta Herculis.

With respect to the last stars I have compared the performance of the instrument with the published observations made at Mr. Bishop's observatory in Regent's Park, London, with an instrument somewhat larger, and have seldom experienced the difficulties noted in the remarks accompanying those observations; the division is generally distinct and easy, and with increasing powers, the separation is quite wide with the aperture of the object glass reduced to four inches, the division is well seen, although the companion is faint; something, it is true, may be due to the position of the companion after an interval of several years. I have also seen the companion of Anteros with the aperture reduced to four inches. It will show, under favorable circumstances, the sixth star in the trapegium of Orion.

It defines nebulous objects well, and shows the nicety of the workmanship in the discrete appearance of some of the swarming clusters.

I could multiply instances, but will merely add, that several competent judges have tested the instrument, and uniformly expressed a high opinion of its performance.

I remain yours truly,

ROB'T VAN ARSDALE.

HENRY FITZ, ESQ.

New-York, *March* 8, 1855.

Mr. Henry Fitz:

Dear Sir—In reply to your request for some information as to the character and performance of your nine inch object glass, I must premise by saying that I have had no weather since your last work upon its surfaces, fine enough to do ample justice to a telescope of its dimensions, and before your request I was rather engaged in prosecuting my double star measurements than in searching for such tests as would convey an idea of its powers. I can, however, safely say, that considering its most unusual proportions, nine inches aperture and nine feet focal length, its corrections both for color and spherical abberration, are remarkably perfect. In running the eye piece inside of the focal point, the margin of the image of a white star is of a bluish claret; in coming out, a rather decided green; and the color of the moon and Saturn remain unchanged with high powers. The magnified disks of stars inside and outside the focal points, are of almost equal and uniform dilation, whilst the focal point itself is one of the extremest nicety, the slightest variation from which, in either direction, is at once fatal to definition. I am sorry that I am not able to refer you to any very good tests of its illuminating power. The only ones which now occur to me are the following: I saw the companion of Polaris a few days since, nine minutes after the sun had ceased shining, and last night I distinctly perceived by averted vision, the "star dust" composing the so called nebula near the tip of the Bull's southern horn. On both these occasions, the air, though clear, was extremely disturbed and unfavorable. Saturn in a good atmosphere is shown clear and sharp, without stray light or haze, on a black ground. On many occasions I have seen the shaded line in the outer ring, which, with smaller power, appears like a division, but which, I am satisfied, is not at all analogous to the dark, well defined line which separates the inner and outer ring. The new dark ring is also well seen, having its margin nearest the planet sharply defined, and its color though sombre indeed, well contrasted with the black space adjoining.

So far, I have been unable to detect any evidence of veins or other inequalities in the substance of the glass, which I look upon as of rare purity.

Owing to the great aperture of the objective, the disks of stars are extremely small, thereby enhancing its power of separation. I find in my notes of the measurement of No. 52 Orionis, whose distance is 1″43. that with a power of only 100, they were clearly separated, forming a beautiful miniature of Castor.

The disks, in a good atmosphere, are round and small, with power of 600 and 850. With the latter power I have distinctly seen the separation of the companion of *y* Andromedæ and *w* Leonis, neither of which have a distance at this time greater than 0″5. The elongation of these most difficult objects is seen plainly with 400; with 600 they become notched with a line occasionally seen between; with 850 they become decidedly detached, whilst the disks are not larger than with 200 in my old six inch telescope. I must add that neither of these stars has been observed in what would be called a fine night. After an account of the performance of this objective upon the two last mentioned tests, it would be needless to accumulate descriptions of its action upon *z* Cancri, *e* Arietis, 32 Orionis, the 5th and 6th stars in the trapezium, &c., &c., which are in comparison easy stars, and have all been shown with a power of less than 200.

You will be good enough to excuse the poverty of my list of tests, which has been circumscribed by the unfavorable state of the atmosphere during the short time since you delivered the glass to me. Still enough has been seen to warrant my most sincere congratulations upon the achievement of corrections in a glass whose proportions presented unusual difficulties, hitherto surmounted but in one other instance, a telescope made by the venerable and learned Amici, of Florence, having exactly the same ratio of aperture and focal length, viz, nine inches to nine feet.

I hope at a future day to be enabled to present you with a more extended list of tests of illumination.

Yours very truly,

LEWIS M. RUTHERFURD.

175 *Second avenue.*

I cannot permit this occasion to pass without expressing the great satisfaction I have experienced from the use of your simple contrivance for connecting the motion of the driving clock with the polar axis. This may be called a detached connection, for without interfering with the movement of the clock, it permits the observer to turn the telescope in any direction, thus enabling him to compensate for any errors of the clock motion, or turn to a different object without leaving the eye piece or throwing the clock out of gear. L. M. R.

MICROSCOPIC EXISTENCE.

Collected by Henry Meigs, Recording Secretary of the American Institute.

THE MICROSCOPE—By S. W. Leonard, F. M. S.

It reveals the astounding fact that miles of strata of great thickness are almost entirely composed of the skeletons and shells of minute animals, in the formation of which ages must have elapsed, minute vegetables and animal races in air, water at the bottom of, as well as in oceans, from the ice of the poles to the burning sands of deserts in the torrid zone. Of the minute vegetables our botanists claim two, viz., Desmidicæ,* which have a horny skeleton and live in fresh water, the other are called Diatomaceæ,† which are principally found in salt water, and whose skeletons are of silica. It is scarcely yet settled whether these minute beings are of vegetable or animal production. The botanists seem at present to have the best of the day. These creatures puzzle

Note by H. Meigs. Lindley, in his Vegetable Kingdom, treats of the *algal alliance* (sea weed), and places in the natural order of algals

* 1st. *Diatomaceæ.*—These are crystalline, fragmentary bodies, brittle, multiplying by spontaneous separation.

2d. Vesicular, filamentary or membranous bodies, multiplied by zoospores (living seeds), generated in the interior at the expense of their green matter. These are *Confervaceæ.*

3d. Fucaceæ, cellular or tubular unsymmetrical bodies, multiplied by simple spores formed externally.

4th. *Ceremiaceæ.*—Cellular or tubular unsymmetrical bodies multiplied by tetraspores.

5th. *Characeæ.*—Tubular symmetrically branched bodies multiplied by spiral coated *nuculcs filled with starch.*

* *Desmidicæ.*—Putrifying very slowly, have no siliceous coat, and therefore alter their shape in drying. When in perfection they are generally of an herbaceous green color, and not unfrequently have the fragments divided into two portions, resembling each other in form but sometimes differing in size much. This division is marked in Desmidium Mucosum by a shallow groove passing round the joint. The starch shows that these, as well as the Diatomaceæ, are vegetable and not animal. They are natives of still waters and oozy places in the northern part of the world. *Uses to man unknown.*

our philosophers. However, they form extensive rocky strata, chains of hills, beds of marl, every description of soil almost contains the remains of these little plants, whether on the surface, or when earth is raised from great depths. Some great tracts of country have been built out of their ruins. Our globe is a vast catacomb of Diatomaceæ. The modern race is precisely like the most ancient. The ice of the antarctic ocean is full of them, so that they stain it of a pale ochrous color, and they are gradually producing a submarine deposit of vast dimensions which flanks the whole length of the Victoria Barrier, a glacier of some four hundred miles in length, and the deposit is one hundred and twenty miles broad. All the soundings here brought up scarcely anything but Diatomaceæ. These wonderful creatures, which, by the way, are very much unlike plants, are found also in ponds, in lakes, and travel in air. They are found floating in the atmosphere of the tropical Atlantic. Darwin, during the voyage of the Eagle, collected an impalpable dust which fell on the deck when to the west of the Cape de Verde Islands. On examination with the microscope it was found to consist of skeletons of Diatomaceæ. They are supposed to have been ejected from some volcano as their silicious skeletons resist the action of fire. (Yet we melt silex easily.—Meigs) Our chalk cliffs of England are made of shells and corals ; manufactured into whiting, we wash our ceilings with them. Does not London milk contain them? Are they not in our physic? and in our sugar, plums and comfits?

Two other tribes of minute beings are less equivocal. The Fungi, some of whose sporules (seeds) float about in the air every where and in everything, and are ready to burst into life wherever they find a suitable matrix to grow in. Some sorts of these are *luminous*. The Rhizomorpha is phosphorescent, and lights up some mines. Mr. Queckett has examined numerous articles and decided their qualities by his microscopes, such as guano, tea, &c. The Chinese mix millions of pounds of leaves of other plants with tea. The character of diseases has been, in some measure, determined by the microscope. Mildew, ergot, wheat blight, &c., have been examined, and remedies suitable applied. Sugar, coffee, milk, &c., &c., have been proved. The appearance of pure milk is very beautiful. The semi-opaque but yet bright

appearance of the oily particles, the butter, their perfectly spherical form, from the largest to the smallest globules, without the least cloudiness, are the characteristics of perfectly pure milk. Here are drawings of them on our table. The milk of wet nurses is proved by the microscope. There is found a great variety in the nutritious qualities of different nurses.

An exceedingly beautiful and wonderful sight is the circulation of the blood in a trout (just hatched), scarcely half an inch long: the rapid flow of the blood through its arteries, and its return by the veins.

I am not surprised at the enthusiasm of Ehrenberg's imagination when I behold these minute creatures, the *volvox*, orb within orb, instinct with life in every part, *rolling* onward in beauty and magnificence beyond conception to any one who has not beheld them, unceasingly revolving their brilliant *emerald forms* in *sportive grandeur*, while the deep rubies, that eyes seem to be, complete the splendor of their gorgeous bodies. This may well lead us to fervent adoration of the Almighty Creator.—*Journal of the Society of Arts, London, May* 26, 1854.

N. B. by Meigs.—These observations all tend to the knowlege of agriculture, and as we go on to learn, will, from time to time, take a place in our practical lessons, for we think that all our knowledge is in infancy.

Some weak modern philosophers continually attack holy writ with their geologicals; they require six million times six thousand years to do the cosmogony. So many Infusoria at work for countless ages, (inter alios.) Now Ehrenberg says that a single individual of the Hydatina seuta produce in twenty days a million! calculate then the geometrical progress for 1,000 years.

Sporules.

The word is from the Greek σπορφ, a seed, and the diminutive ule, a little seed. Why not have it so at once, in a lesson for English ears.

In treating of the Fungus family, or as he calls it, "Fungales," he quotes all the best authorities as usual. Fries is opposed to

the idea of an accidental production of mushroom or other fungus; he says that in one of these "*Reticularia Maxima*" he reckoned ten millions of these sporules; they are scarcely visible to the naked eye, and often resemble thin smoke; that they rise into the air by an attraction of the sun, by evaporation, insects, wind, elasticity, adhesion, &c.; it is difficult to conceive of a place from which they are excluded. [Note by H. Meigs.]—Boys and men in the country have almost all observed the smoke which rushes out of a dry puff-ball (a fungus) when quickly struck or trod upon.

Dutrochet obtained different genera of fungus (mould) by using different infusions. Certain acid fluids produced *monilias*, and alkaline mixtures yielded botrytis. It is supposed by some that the seeds (sporules) of one sort can produce several different ones including mosses. The fungi out of the tropics are so numerous that no one can conjecture the number of them. If they are fortuitous, then of course the number is not to be determined. Fries discovered two thousand species within the compass of a square furlong. About half a dozen kinds of mushrooms are eaten in London, but in Paris none are permitted to appear for sale except the common truffle, morel and mushroom. Extreme caution is necessary in using them, for it has been found that some of those which are usually perfectly wholesome sometimes produce the most disastrous effects on those who eat them. It is true that Pallas names many kinds which are eaten with impunity by the Russians. Climate, or the mode of cooking them, may cause this difference. Delile says that Paulet, in 1776, ascertained that salt and vinegar removed every deleterious principle from that most poisonous fungus the agarian, and the Russians always salt them, still none are safe but our cultivated mushrooms.

Australia produces a fungus weighing two pounds, eaten by the natives by the name of native bread. The marsupial animals (*pouch* animals) devour these greedily.—*Lindley's Vegetable Kingdom.*

Note by H. Meigs.—The fact that any animal feeds and flourishes on a particular food forms no lesson for man. I have seen a goat

swallow upwards of twenty of the ripe seed-balls of stramonium, chewing them up with evident relish. I have seen the red bird of the tropics filling his crop with the ripe red pepper pods.

Size of the atoms of light.

Newton's estimate of these dimensions remains, viz:

Green, each atom is in diameter the	15	millionth part of an inch.
Scarlet,	19	do
Yellow,	16	do
Orange,	17	do
Vegetable green,	25	do
Blue and purple,	12 and 14	do
Sky blue,	$2\frac{3}{5}$	do
Pure white as silver,	5	do
Other whites,	15 to 25	do
Black varies from	$\frac{1}{2}$ to 2	do

The late experiments of Mr. Ellis prove that the green color of plants arises from their nitrogenous character, that the red colors are due to oxygen, and indigos and violets to hydrogen.

Frauenhofer determined the waves of light to be as follows, in parts of an inch:

Red,	2,582	millionths.
Orange,	2,319	do
Green,	2,073	do
Blue,	1,912	do
Indigo,	1,692	do
Violet,	1,572	do

The intermediate spaces are black, but when these colors mingle they form white.

By comparison, Dr. Young's eriometer (wool-metre), for measuring fibres and atoms, determined that a seed of the Lycopodium (the club moss) was in diameter the 10,500 part of one inch.

Milk, atoms of,	.....	9,000	do
Human blood, atoms of,	.....	4,000	do
Silk fibres, do	.....	2,000	do
Cotton, do	.....	1,400	do
Saxony wool, do	.....	600	do
South Down wool, do	.....	281	do
Coarse wool, do	.....	150	do

The waves of red being about $\frac{1}{25}$ millionth of an inch in length, then as 100 grains of sand in diameter equal one inch, the length of a side of one cubic grain contains about two millions of waves, the side of the grain must contain four million millions, and the whole cubic grain must contain eight million billions of these waves.

As the atoms of milk are $\frac{1}{9000}$th of an inch, then a cubic grain of sand (which is accepted at $\frac{1}{100}$th of an inch) contains $\frac{1}{9000}$th part of $\frac{1}{100}$th of one inch in length, and in cubic contents 7,290 millions; the atoms of human blood in the size of the cubic grain of sand, about 3,000 millions; Lycopodium (club moss seeds), more than 8,000 millions.

A soap bubble, when about bursting, is $\frac{1}{4}$ millionth of an inch thick; or it would require half a million of them to make a film $\frac{1}{8}$th of an inch thick.

Atoms less than $\frac{1}{8}$ millionth of an inch are black, because they are too small to reflect light.

Frauenhofer actually made a machine with which he drew 32,900 lines in the space of one inch.

PROCEEDINGS OF THE FARMERS' CLUB.

[ORGANIZED JUNE 22, 1843.]

The Farmers' Club of the American Institute is under the direction and control of the Committee of Agriculture.

The meetings are held on the first and third Tuesdays of each month, at 12 o'clock M., except the months of March, April, and May, when they are held weekly, at the rooms of the Institute, No. 351 Broadway.

The meetings are free to members of the Institute, and all other persons connected with the pursuit of agriculture, or who may desire through this medium to diffuse information on the subject of cultivation.

The Club will be happy to receive written communications at its meetings, on the subject of agriculture, horticulture, the raising and improvement of stock, and chemistry applied to agriculture.

April 4, 1854.

Present—Prof. Mapes, Prof. Renwick, Judge Scoville, Hon. John B. Scott, Messrs. Berrian, of Illinois, Dr. Wellington, Mr. Bullock, of the Banner of Industry, Mr. Palmer, of North Carolina, Mr. Schenck, of New Jersey, Hon. Horace Greeley, Mr. Lawton, of New Rochelle, George Bacon, Esq., Mr. Lowe—in all about fifty members.

Hon. John B. Scott in the chair.

Henry Meigs, Secretary.

The Secretary read the following selections and translations made by him:

[Annales de la Societie Imperiale d'Horticulture.—From the proceedings of the Society on the transplanting of trees, Paris, Jan. 7, 1854.]

Mons. Orbelin said that a sick linden tree was restored to health by transplanting it—that it is a cure. The leaves must, however, be taken off, and careful watering used.

Dr. Aube said that a diseased linden was restored to vigorous health by it, the leaves being on, but covered with wet cloth, in order to serve two purposes—first, to keep them fresh, and next, to diminish the absorptions and exhalations, which are much stronger and more frequent in the open air.

Mons. du Breuil had no doubt of success in such transplantings.

Mr. Jamin observed that planting and transplanting can be done successfully at all seasons—as well when the vegetation is suspended as when it is in the greatest activity, if done in the evening. He had succeeded in doing it.

Mr. Pepin stated that twelve or fourteen years ago Mr. Souchet, the father—then chief gardener at Fontainbleau—received in autumn a considerable quantity of trees, which he continued successfully to plant even as late as the ensuing August.

Mr. Ramon de la Sagra said that transplanting was constantly done within the tropics, in July. In the hottest weather they make holes for the trees. They keep the trees as much as possible from the heat by taking off the branches, wrapping the trunk in mosses—especially the conifers.

Mr. du Breuil said this way was very rational in the tropics. The vegetation must be restrained; that can be done by several transplantings, which relax the growth and enable the tree to gain time for future vigor. I advise the taking up trees in February, and keep them out until the time for planting.

Mr. Jamin thought so too.

Mr. Malot saw at Montrouge trees taken up in May, kept wrapped up; they blossomed—and after that set out in July, and not one died.

The President asked Mr. du Breuil for his opinion of hybridation.

Mr. du Breuil replied that it was a very complex subject, which required meditation; he would think of it; *a priori*, he believed in it.

The President—I understand hybridation as between two very distinct species, but always of the same genus.

Mr. Bossin stated the difficulty of crossing between the Queen Margarets and the asters.

Mr. du Breuil—And between the mirabilis jalapa and longiflora.

Mr. Bossin—And between the triticum sativum and chess.

Mr. Forest said the malady of the vine was developed at about 15° Centrigrade (about 75° Fahrenheit).

Mr. Flantin said the development occurred at about 12° Centigrade (about 50° Fahrenheit).

[Extracts from the London Farmer's Magazine of March, 1854. By. H. Meigs.]

CLOVER SICK LAND.

"A recent discussion at the Croydon Agricultural Club has conferred a deeper interest on this subject, which has proved a source of anxiety everywhere. It was there asserted by one of our first rate farmers that in the lands about this locality of East Surrey a repetition of the clover crop could not be successfully attempted under a period of eight years! Having long been aware of the fact existing generally, though admitting exceptions in respect to difference of time and soils, while clover was found to flourish in the headlands, it failed in the fields."

Much speculation is abroad with respect to the cause of this very much dreaded failure, and about a remedy. Many plants

besides the potato have been affected with strange symptoms—not unlike cholera among man. It is proposed to analyze the clover and the soils in search of causes and remedies.

The turnip disease is under anxious examination. This disease—of forty years standing—amongst our valuable turnips evades all our talent at investigation. The labors of the Highland and Agricultural Society of Scotland are amongst the melancholy instances of the worthlessness of some of the ill-considered investigations often made with the sanction of high apparent authority. Some said lime is the cure; others found no effect from it. The remark, as poetical as erudite, is this: that animal and vegetable organism was a struggle between vitality and chemistry, and that death was the victory of chemistry. Vitality, in its laws, its manifestations, and its modifications of chemical action, render the different steps in the struggle difficult to determine with any great degree of precision. The laboratory does not always reveal the secrets of chemico-vitalism. Analysis will sometimes no more determine a question in an organized structure than synthesis will form an animal and a plant. The chemist can decompose—can separate—can determine—the various elements; but he can often no more derive any practical lesson from this fact than he can add all together and make again the vitalized machine he separated.

The soils of the sound and unsound turnips have been analyzed. That made by Mr. Robertson, of Lady Rig, is as follows:

	Soil of the sound turnip.	Unsound.
Insoluble silicates,	87.89	87.88
Soluble silica,	00.07	00.05
Peroxide of iron,	2.94	2.75
Alumina,	1.59	1.28
Lime,	0.38	0.32
Magnesia,	0.13	0.55
Potash,	0.14	0.20
Chloride of sodium,	0.10	0.06
Sulphuric acid,	0.05	0.03
Phosphoric acid,	0.04	0.16
Organic matter,	4.16	4.55
Water,	1.75	2.09
Total,	99.75	99.93

Other analyses are very much on all fours with this. The only difference noticeable is, that potash and phosphoric acid are more abundant in the soil where the diseased than where the healthy plants grew.

	Healthy.	Diseased.
Chloride of sodium,	13.990	5.153

Analysis referred to by Prof. Mapes, in his remarks upon Indian corn, April 4, 1854:

Soil of Mr. Berrian, of Quincy, (Illinois,) air dried.

Water,	3.70
Human ——— vegetable,	15.30
Mineral constituents,	81.00
	100 00

The mineral constituents. (Soluble in hydrochloric acid.)

Potash,	0.10
Soda,	0.02
Carbonate of lime,	1.25
do magnesia,	0.46
Oxide of iron and alumina,	3.32
Phosphoric acid,	0.02
Sulphuric acid,	0.16
Chlorine,	trace.
Insoluble silicates and silicic acid,	93.94
Loss,	0.98
	100.00

The insoluble silicates consisted but of clay. By levigation of the soil there was not left any silicious sand.

The amount of ammonia was found to be in 100 parts, 0.10.

By CHARLES ENDERLIN, 34 Walker-st. N. Y.

Judge Van Wyck.—Indian corn, as has been observed in this club on other occasions, is a grain of immense importance to our country. According to the reports of the Patent Office for 1850,

the corn crop of the nation that year was 592,141,230 bushels; taken now, it would probably amount to a little over 600,000,000 of bushels, which is considerably greater than all the other grains together, and renders it much more valuable to the nation at 50 cents a bushel, than wheat at $1.50. The best way of cultivating so important a cereal, so as to obtain the greatest crops, and in the cheapest way, are the great objects we have in view in discussing this question. From 1820 to 1842, different States and sections of our country have been in the practice of getting extraordinary crops of Indian corn. In 1820, near Silver Lake, Pennsylvania, 136 bushels were taken from an acre; John Stevens, of Hoboken, obtained 118 the same year; in Madison county of this State, 172 were obtained, and also 174, the last in 1823, same county, besides many other cases in Massachusetts, Connecticut, Ohio, &c.; in this last State 140 bushels were obtained from an acre, 40 acres together, 5,600, in 1835. This may be considered the greatest; the others were small pieces, from one acre to five, and easily tilled well and made very rich; besides many more, varying from 100 bushels and over, and all appearing to be well authenticated. It would seem from this, that before guano and bone dust were known in our country, much more used, great crops of corn were obtained, and that probably by the means of the barn yard and old homestead manures of the farm. I went last fall in the interior, in Westchester and Dutchess counties, in September and October, near or about the time of corn gathering. I visited a friend near Peekskill; he has an excellent farm, and is a good farmer; his corn was very good. I have no doubt it averaged him fifty bushels to the acre—about twelve acres. He generally cultivates for corn a timothy and clover sward, and that has lain some three or four years, manures well, generally broadcast, with barn-yard manure, well kept during winter, spreads it on the sod, and plows both under; plows from seven to nine inches deep. The sod and manure, when rotted, he thinks will and does make a good bed for corn. This must be kept clean and mellow during the season of growing, which he does by plowing and hoeing as often as is necessary to effect these objects; he makes generally much more use of the plow or cultivator than he does of the hoe. Cornstalks, he thought, made an excellent

fodder. Most kinds of stock are fond of them, especially milch cows. They must be got in in good order, and well taken care of. He considered them nearly as valuable as hay. Last year he fed them out rather freely to his stock the first of the winter, and he was afraid he would run short, and about the first of February he put them on hay, and his cows in two or three days fell off full one-third in milk; he put these again on stalks, and they soon recovered a part of their loss. He makes no use of special or concentrated manure; he makes use of lime occasionally on his land. I visited several farms in Dutchess county about the same season. One gentleman had about thirteen acres of corn on land he had lately purchased, and the soil, as he thought, rather thin. He plowed and hoed much as the gentleman near Peekskill did. Instead, though, of using barn yard manure entirely, as he had but little of it, he used muck and guano—three shovelsfull of the former to one of the latter—and put it on broadcast; and a part of it he manured with this mixture in the hill; his crop was fine, and yielded him, I have no doubt, fifty bushels to the acre. Another farm had about 16 acres on it, which had been kept in sward about seventeen years—timothy and clover—and grazed every season. Not a shovelfull of barnyard or special manures, the gentleman assured me, had been put on the lot in that time. All the manure it had was the falling and decaying of the grass upon it every autumn, and the droppings of the cattle grazed upon it every season, and which formed as rich a soil as manure of any kind could make it, and I have no doubt it yielded him at least fifty-five bushels, and perhaps 60 to the acre. Another farm adjoining—larger—had about fifty acres of corn upon it, and which I think would yield at least forty-five, and perhaps fifty bushels to the acre. Many other farms in this quarter I visited, had corn crops upon them similar in prosperous appearance. I should say the average yield of Dutchess county this year, in corn, would be from thirty to forty bushels an acre, and perhaps more. It has been a fine season, at least for her. The Patent Office Report for 1850, puts the corn crop of Dutchess county down at 782,605 bushels, for that year. This is larger than any other county in the State of New-York, although Dutchess county is little more than half as large in extent as

most of her sister counties, and only half the population of many of them. This shows what Dutchess county is for the products of the soil, and especially that valuable crop, Indian corn, and whether her intelligent, industrious population understand the cultivation of it.

Solon Robinson said, that, upon the subject of Indian corn, he would make a few remarks upon the manner of cultivating that crop in the South. In all of the slave States, the little one horse shovel plow is in common use. This plow is made of a piece of thin iron, like a pointed shovel, say nine inches across, which is fastened to the standard under the beam, and the whole is so light, that I have often seen a negro girl of 14 or 15 years old, mount her mule, and take her plow on her shoulder or before her, to ride to the field. With these tools the ground is scratched over and corn planted and tended by the same implement. As the subsoil is hard, the roots only spread through the loose earth on the surface, and the after plowing serves to tear them to pieces. In lower Virginia, it is common to throw the land all into beds about a foot high, five feet apart; and plant one stalk in a place, from two to four feet apart. The crop is 10 to 20 bushels. One of the largest planters on the Roanoke, cultivates about 3,000 acres in corn. His land is very rich and subject to overflows. He does not manure, and burns his stalks and cobs to get rid of them. The yield averages perhaps thirty bushels. In the same vicinity the Messrs. Burgwin have brought the average yield of their land from seven to thirty bushels, principally by deep plowing. They plant rows five feet apart and stalks one to two feet apart. Uplands in that vicinity, plowed by one horse and the little shovel plows, produce five to ten bushels to the acre. It is planted about the 20th of April, 4 by $4\frac{1}{2}$ feet, one stalk in a hill without manure. On the bottom lands of James River the average yield may be about 25 bushels. On the Sandy Point estates, where the land is a true loam, and plowed with a three mule team, and planted about the 25th of April, $5\frac{1}{2}$ feet between rows, and $1\frac{1}{4}$ between stalks, the yield is thirty-five bushels average. The seed is covered with a harrow and the crop tended with a shovel plow. The annual crop is 500 acres. Gen. Peyton, above Richmond, took an old plantation and renovated it by deep

plowing. He run what is called a coulter, which is a small subsoil plow, to mark the rows, and then again on each side after the corn is up. This lets the roots down sixteen inches to search for food and moisture. Ed. Ruffin has renovated an old farm on the Pamumky, east of Richmond, by the use of marl and deep plowing. He plants four by five feet, two stalks in a hill, and 5 by 2 feet, one stalk in a place. Mr. Ruffin is the champion of calcareous manures, and has caused many thousand acres of worn out land to be restored. The Sandy Point estate has been limited three times, with first, 50 bushels; second, 35 bushels; third, 35 bushels; and is cultivated on the five field system—that is corn, wheat, clover, wheat, fallow. The annual wheat crop is 1,000 acres, which has been increased from an average of three bushels to seventeen. There are 2,700 acres of plow land in one field. The corn crop is from 15,000 to 20,000 bushels a year, about two-thirds of which is sold. On Edisto Island and upon the coast of South Carolina generally, the cultivation is all done by hoes. A negro will tend six to eight acres in cotton, corn and potatoes. Upon the plantation of Mr. Townsend, who has made efforts to induce people to use the plow, the task of his hands is five acres of cotton, and one of potatoes, to each field hand. The cotton is the Sea Island variety, and produces an average of 170 lbs. per acre. Corn, 20 bushels; sweet yam potatoes, 12,742 lbs.; yellow yams, 21,344 lbs. A heaping bushel weighs 86 lbs., and half that is the ration of a hand for the week, with soup twice, made of beef or mutton, 15 to 13 lbs. to 70 or 80 quarts of water, to which is added vegetables. In times of hard work, soup is given every day. In summer, a peck of corn is given in place of the potatoes. On other plantations, the weekly rations are a bushel of potatoes or a peck of corn, or broken rice, and no meat. At extra hard work, ditching, &c., the rations are 3 lbs. of meat, 4 quarts of corn or rice, and a quart of molasses a week. Corn is the great dependence for feeding men and mules, and the general average by hoe culture is less than ten bushels per acre. In all the Southern States there are thousands of acres planted every year, upon ground scratched over by the little shovel plow, that does not yield ten bushels per acre, and much of it not five bushels. The great fault everywhere is shallow plowing, and that is the reason

why corn crops do not average better in all the corn-growing States. Mr. Robinson said, he hoped strangers present would not take an opinion they had reiterated here to-day, that concentrated manures are useless, as the opinion of but one member of the Club. We have never recommended a farmer to neglect his barn-yard manure, but to add guano, bone dust, improved superphosphate, and everything of the kind that he can buy, because no farmer can make as much manure as he can use profitably.

Prof. Mapes—I protest against this club entertaining or tolerating the repetition of the nonsense that barn-yard manure is all that is necessary to be applied to any land, or that it is not profitable for a farmer to purchase just such specific manures as analysis shows the land requires. You all recollect the crop of Indian corn I produced upon land where manuring did but little good. The land wanted chlorine and phosphate, and this I applied at a cost of about $2 an acre, and doubled the crop of corn. I hold in my hand an analysis of Illinois prairie soil, that shows it is rich in all but one or two cheap ingredients, necessary to its utmost fertility. If these are added, and the land drained and plowed deep, it will be always productive. Notwithstanding the last crop was 80 bushels per acre, it may be nearly doubled, and so may the crops of almost all of our farmers. It is nonsense for a Dutchess county farmer to be content with forty bushels of corn per acre when he can get eighty bushels by $3 more expense.

The learned Professor, after receiving constant applause, said, "I am but a collater of other men's ideas—none of my own. I put forth the good, analyze and add the missing ingredients to your land that's best!"

Mr. Lowe made some valuable observations relative to the very useful action of clover and its roots, in bringing up to the surface of the soil the inorganic constituents of the soil.

Subjects for the next Club "Indian Corn and Fences," proposed by Solon Robinson.

Mr. W. J. Stillman presented grafts from a seedling plum of Schenectady, called the Duane plum, of which one other tree, a

graft of the first, is in existence. It ripens from two to three weeks earlier than any other variety with which Mr. Stillman is acquainted. Mr Duane, of Schenectady, raised it. It is about six inches in circumference, almost precisely resembling a nectarine—color a deep dark red. Horace Greely undertook to propagate one, and William Lawton, of New Rochelle, the other.

Members are earnestly requested to bring to the meetings the finest grafts, cuttings, seeds, &c.

H. MEIGS, *Secretary.*

April 11, 1854.

Present—Judge R. S. Livingston, Prof. Mapes, Prof. Hooper, Messrs. Coleman, Greeley, Reese, Bunting, Carter, Judges Van Wyck and Scoville, Bullock of the Banner of Industry, Solon Robinson, Scott, Shorey, Porter of Jersey, Longworth, and others about fifty members in all.

Hon. R. S. Livingston, in the chair.

Henry Meigs, Secretary.

The Secretary read the following selections and translations made by him:

Value of one year's manure in England.

It is estimated that it amounts to three hundred millions of dollars worth more than the entire foreign commerce of England. The total value of a year's crop has been reported to parliament, some time ago, as being about three thousand millions of dollars (the crop includes every animal and vegetable, of course), and that, in 1844, the turnips of England, taken in whole of their utility, were valued at one-half of that great sum, viz: fifteen hundred millions of dollars.

Fleas on cucumbers.

It is said that tomatoes growing among them drives off the enemy.

Prof. Mapes said that he doubted this.

Grafting wax.

A successful grafter uses the following:

Two parts of resin, one part beeswax; work the mixture with your hands, adding small quantities of tallow or of lard; work the whole to about the consistence of glaziers' putty.

This composition will not melt down in hot weather, nor crack in dry, windy weather.

Approved by Judge Livingston.

Prof. Mapes said that a better article was composed of one-half Canada balsam, ditto of beeswax.

This, melted, may be poured on to sheets of paper; when cool, cut into ribbons of any required length and breadth—will adhere to wet surfaces. I work it in my hand when I want to apply in mass, adding some vermillion for the look of it.

Pollen.

[From Balfour's Manual of Botany, London, 1851.]

A stamen consists of two parts, the filum (or thread) and the anther, which last contains the powdery matter called pollen. Pollen consists of powdery matter contained in the anther; they are small cells developed in the interior of other cells; when mature the pollen-grain is a cellular body, having an exterior (outside covering) and an interior (inside). Fritzsch states that he has detected, in some cases, other two coverings, which he calls intextine and exintine, color generally yellow, and the surface often covered with a viscid or oily matter called *fovilla*. This fovilla contains small spherical granules, sometimes $\frac{1}{3\,0\,0\,0}$th of an inch in diameter, and ellipsoidal or elongated corpuscles, which are said to exhibit movements under the microscope, similar to those seen in infusoria, and in some algæ. Pollen, again vary from $\frac{1}{3\,0\,0}$th to $\frac{1}{7\,0\,0}$th of an inch, or less in diameter; their forms are much diversified; the most common form is ellipsoidal, more or less narrower at its extremities, which are called its poles, &c. Prof. Mapes, at the Club of April 4th, said that some pollen was composed of balloons which contains just hydrogen gas enough to float them in air at the proper elevation to reach the flowers of

like plants, and the charge of hydrogen gas must be of extreme precision to enable the little balloon to float so accurately at the requisite height.

If the charge was more or less the little balloon would rise too high or sink too low. The form of the pollen grain differs much in different plants. The pollen contains tubes from inside to out. The wistaria, a vine so called from the late Dr. Wistar, of Philadelphia, produces bunches of lilac colored flowers of great beauty and numbers. On one vine there have been estimated in one season, 9,000 bunches, 675,000 single flowers, 3,375,000 stamens, and 4,050,000 ovules. And for the purpose of fertilizing these ovules, the anthers, if perfect, would have contained 27,000 millions of pollen grains, or about 7000 to each ovule.

Insects also convey pollen to flowers and thus fecundate them. Orchidaceous flowers are well distinguished by the peculiar forms of their flowers, their remarkable lip, gynandrous stamens (male and female), and their pollen masses. Their flowers resemble (often) insects, such as butterflies, moths, bees, flies, spiders—or birds, such as doves and eagles—or reptiles, such as lizards and frogs. The colors and spots on the perianth sometimes give the appearance of the skin of quadrupeds, such as the tiger and leopard, and these resemblances are often indicated in the generic and specific name.

Note by H. Meigs.—Orchids are found growing all over the world, excepting in continual dryness or excessive cold. They grow on branches of trees, on stones.

[Revue Horticule.]

Gingko biloba, growing in Montpelier.

The Forty Crowns Tree or nut of Japan, was first noticed by Kampfer. Thumberg fixed its locality at Nangaraki, in the Japan Island of Niphon. In Japan it is considered, says Siebold, as originally from China. It there attains an enormous size. Bunge says that he saw one at Pekin, near a Pagoda, which measured nearly 43 feet in circumference, and it was of prodigious height. It is a curious tree. It succeeds at Montpelier, bearing annually perfect fruit. One was brought to England in 1754, and lived 30 years.

There is one at Sacconex, near Geneva, a magnificent one (male) in the botanic garden of Pisa, nearly 80 feet high and three feet diameter. The gingko is a conifer.

R. L. Pell said—The subject for debate this morning before the Club, is the cultivation of corn, and, as it is utterly impossible to raise that important cereal advantageously, or profitably, without understanding the constitution of the earthy part of the soil, I will, in the first place, state how that knowledge may be obtained by any agriculturist, without the aid of a chemist. Soils may be thus classified:

1. Pure clay consists generally of 60 per cent of silica and 40 of alumina and oxide of iron, chemically combined. When passed through water, no silicious sand subsides.

2. Strong clay consists of pure unctuous clay, mixed with from 8 to 16 per cent of sand, which you can readily separate from it, by boiling, and pouring off gently.

3. Clay loam differs from a clay soil by permitting from 15 to 30 per cent of sand to be separated by boiling and decanting as above.

4. A loamy soil allows from 35 to 65 per cent of sand to deposite by washing.

5. A sandy loam deposits from 65 to 95 per cent of sand.

6. A sandy soil contains very little more than 9 per cent of clay.

To name your soils as above, examine as follows: Weigh a certain quantity of earth, spread thinly over letter paper, place it on a hot plate in an oven for an hour, but do not permit the heat to be so great as to render the paper brown. The loss of weight when again weighed indicates the water it held. While this operation is performing, weigh and boil another portion, and pour it into a glass jar, and allow the heavy parts to subside until the fine clay begins to settle. Then pour off the liquid, collect the sand, dry it upon paper, and weigh. This weight will be the quantity of sand in the known weight of wet soil. Thus, suppose

two parcels of 200 grains each are weighed, the one you placed in the hot oven loses fifty grains of water, and the other one deposits sixty grains of sand; the 200 grains of wet soil are equal to 150 grains of dry, and the 150 of dry soil contains 60 per cent of sand, or 40 in 100—40 per cent. You would then call it a loamy soil. In marly soils in which the proportion of lime does not exceed 20 per cent of the whole weight of the dry soil, the marl is loamy, clay or sandy, according to the proportion of clay it contains.

In calcareous soils, if the lime exceeds 20 per cent they become calcareous loams, clays or sands, according to the proportion of clay and sand in them.

If you wish to determine the quantity of vegetable matter in a soil, dry it perfectly in an oven and weigh it; then heat it to redness, and burn away the combustible substances and weigh it again. The quantity lost is the organic matter.

We have a surface and a subsoil. The first is formed by the growth and death of plants, and thus enriched becomes dark in proportion to the quantity of vegetable matter contained. The subsoil, into which the roots of plants rarely penetrate, though not discolored, nevertheless contains vegetable or organic matter, carried into it by water, and would materially advance the growth of plants if it were ventilated, or, what is still better, subsoil plowed.

Mr. James F. W. Johnston, to whom I am indebted for much information, says: "A soil to be fertile must contain all the substances which the plant we desire to grow can only obtain from the soil, and in such abundance as readily to supply all its wants, while, at the same time, it must contain nothing hurtful to vegetable life." If agriculturists could have their soils analyzed, they would save themselves in many instances large sums of money, and realize handsome profits. I have known gentlemen to administer to land considerable portions of gypsum, bone earth and salt without success, and afterwards, upon having an alalysis

made, those substances were found present in sufficient quantity, and some other matter was wanting.

A cubic foot of calcareous or silicious sandy soil weighs nearly	112	pounds.
A soil in which clay and sand are equal,	96	do
A soil which we consider arable,	86	do
A soil abounding in clay,	76	do
A rich mould or garden soil,	72	do
A muck or peat soil,	55	do

The weight of all soils decreases as clay increases, and continue the decrease as the vegetable matter increases. Dense soils are much less injured by the tramping of cattle and passage of wheels over it than others, and retain their warmth longer after sunset. A peat, or muck soil, will cool more in one hour than a pipe-clay in two and a half, and a sand in three and a quarter hours. All soils resist the plow more when wet than when dry, and an iron plow less than a wooden one. A wet sandy soil resists the plow equal to from 4 to 5 lbs. to the square foot, a garden soil from 5 to 7 lbs., and a clay from 7 to 30 lbs., because it adheres to the instrument more than any other soil. A good agricultural soil should possess the power of drinking moisture from the dewy air at night, which in dry seasons is of immense importance. I once dried two hundred and fifty pounds of a very rich and fertile garden soil, and exposed it to a moist atmosphere for one hour, when it weighed 254½ pounds, having absorbed in that short time 4½ pounds of water. I then dried 250 pounds of coarse sand, and exposed it to the same atmospheric influence for an hour; when weighed again it had absorbed only two pounds. This shows that rich soils possess the valuable property of absorbing moisture much more rapidly than poor. I desired to discover the power of the same land to retain water, and for this purpose placed 100 pound in a tin vessel, and poured water on gradually until it began to drop from the bottom, then weighed it, and found it had increased 23 pounds. In this way I determined what land would be improved by draining, what by irrigation, which are best adapted to wheat, and which to corn, the subject before us

for discussion this morning. Indian Corn (Tea Maize, from Tao, to live,) is a native of our country, and one of our noblest productions. It is the universal head food of the whole continent, is not indigenous in any part of Europe, and is used perhaps as extensively as rice, which latter is insufficient to sustain the body on account of the small percentage of gluten contained in it, which accounts for the inordinate quantity eaten by the Eastern nations. Carolina has the honor of producing the best rice in the world. Indian corn yields a larger return of farinaceous food from a given quantity of land than any other cereal, and is remarkable for its fattening qualities when fed to hogs, cattle and poultry. It contains about eight pounds of fatty substance to the hundred. I believe from sundry experiments that the quantity of gluten in corn may be much increased by the use of rich nitrogenized manures. The people who live on this grain, and the cattle, horses and other domestic animals fed upon it, are strong, healthy, and capable of enduring much fatigue. What is more delicious to the palate of an American than the young and tender ears, when in the milky state, boiled, and eaten with salt and butter?

Corn is a sure crop, if taken proper care of after it comes up; when four feet high its broad leaves obtain their chief support from the atmosphere. A clover or timothy sward should be manured heavily—say fifty wagon loads of barnyard compost to the acre. In the month of November plow this in, followed by the subsoil, and let it remain until sufficiently dry to cultivate in the spring, then cross-plow, roll it twice, and harrow until pulverized. At any time during the month of May mark rows three feet apart, both ways, with a corn plow, and plant five kernels; after having soaked them twenty-four hours in saltpetre water, cover immediately with a hoe. And if you would raise one hundred bushels to the acre, place the component parts of the corn in the form of a compost in the crop, and plant upon it. When the corn is four inches high run the cultivator twice each way through the rows, as near the corn as possible; when this is finished, commence across the rows, ash and plaster, or use Professor Mape's phosphate of lime, and follow with hoes, cut out the weeds and

thin the corn to four plants; add but little soil, and do not hill them, as level culture is superior. After this you may plow, hoe, and cultivate as much as you please, without injury to your corn, until the 1st of July, at which time you should be able to tie two hills together across your horse's back. If you are annoyed by crows or squirrels, dip kernels of corn in lard and sprinkle some poison over them, and place them near the haunts of your enemies. The first one that partakes of the feast will alarm all his fellows, and the whole party will immediately depart.

If you desire to sow wheat and sod down the land occupied by corn, pull it up by the roots when half the husks have turned brown, and carry it to some convenient place on sleds, and shock it in parcels containing thirty hills, where it may remain until you have time to husk it. If the land is intended for oats the following spring, go through the corn field and husk it while standing, after which pull it up by the roots, shake off the dirt, and house it—your cattle will eat it root and stem during winter, and convert the whole into manure; this mode leaves your field in splendid tilth for oats. The stock farmer cannot raise any cereal crop that will pay him equal to corn. Some farmers commence to cut off the tops just above the ear and strip the blades below, immediately after the corn passes from the milky state, for fodder.

I do not approve of this plan, having, by experiment, discovered that corn cut and stripped yielded in weight 52 lbs. to the bushel, while that allowed to come to maturity naturally weighed 58½ lbs.

A few years since a celebrated chemist in this city analyzed for me the tassel, silk (the first of which is the male, and the second, female), stalk, root, kernel, and cob—likewise the land in which I intended to plant—sub and surface soil. The lacking ingredients were applied to the hill, covered with a hoe, and the corn, after being soaked in salt brine for twenty-four hours, was planted thereon. The season was favorable, and the growth fine. When four feet high a gale occurred from the north, and to my astonishment the corn all simultaneously measured its length in the opposite direction; a neighboring lot retained its vertical po-

sition; when several feet higher a gale from the south leveled it in the other direction; on both occasions it soon recovered its position, and when ripe was vertical. It yielded 100 bushels per acre of shelled corn. On examination I found that the roots had not extended themselves in any direction beyond six inches. In that short space it found the desirable chemicals, assimilated them, made its growth above ground rapidly, produced its crop in profusion, and in good season, whereas, the next field, planted at the same time, and taken care of in the same manner, yielded a late crop of less than forty bushels to the acre. On examination, the whole field, within a few inches of the surface, was found to contain an innumerable quantity of roots spread, like a fan, in every direction. The growth above ground was very superior to the other; the energies of the plant had been expended in searching for nourishment; further comment is unnecessary. I invariably shell and sell my corn in the fall, when it always bears a higher price than at any other season of the year; and there are very many other advantages that it is unnecessary to mention. I suppose the average cost of raising corn, per bushel, with us, is about thirty cents.

In Illinois, Ohio, Kentucky and Indiana, the most celebrated corn raising districts in the United States, it would cost to cultivate it from ten to twelve cents per bushel. I regret that the farmers in those States do not understand their interests better than to pursue so suicidal a policy as to raise annually such an exhausting crop as corn upon their rich alluvial bottoms; it may enrich the present generation, but the one that follows will be impoverished; when, by a judicious mode of rotation, if it were only clover and corn, their land would annually improve, their crops would double, and the rising generation would glory in the wisdom of their progenitors. I fearlessly assert that the generality of soils, in the States above-named, that fifteen years since yielded from sixty to seventy bushels of corn to the acre, now require rotation, deep culture, manure and superior cultivation to produce these results.

At our last meeting we were informed that some gentleman in Illinois had 3,000 acres in Indian corn, and that the land was

plowed but three or four inches deep. Suppose, instead of going over such an Atlantic of domain, the gentleman had properly cultivated one thousand acres, plowed them deep, and manured it. He would have derived much more corn—say 130 bushels to the acre, instead of forty—with less labor and far greater satisfaction, saving more than three square miles of plowing, handling and hauling the grain when harvested. In growing this crop it would be well to remember that to plant it later than the 1st of June is a waste of seed and ground generally—for the reason that the blue rays of the sun, which are the most favorable to the germination of seeds, give way at this season to the yellow rays, during the action of which the leaves are formed and increased. The red rays follow in the fall, and ripen the golden grain.

Were it not for the expense, I would confidently recommend all farmers to form their manures into a liquid for this crop, and indeed for all others, as we know every plant that grows—from the most minute fivefinger vine to the gigantic forest tree—is composed of distinct cells, every one of which is a separate structure and has an independent vitality, depending upon external gaseous nourishment and other food in a liquid form, which permeates through the entire plant in the same manner that moisture spreads through a sponge; when one extremity of it comes in contact with water, soon the whole mass will be wet. You may try a pretty experiment thus, if you doubt: Sprinkle the soil in which a white hyacinth is growing, with the liquid of the Phytotolacca decandra, and in less than two and a half hours, the flowers will be red, and no injury will accrue to the plant. In three days, if the sun is permitted to shine upon it, the purity of its former appearance will return.

Corn should be sown broadcast for soiling, and fodder for winter. Last June I sowed twenty-four bushels on six acres, and ploughed it under, after which the brush harrow was run over it, followed by the roller. It grew finely, when half the field was turned down. It was cut the second day after turned, the fourth day raked into winrows, and the fifth day carted into the barns and salted. The yield was estimated at 5½ tons to the acre. Cows

prefer it infinitely to hay; and, if cut fine and mixed with bran, it forms an admirable food for horses.

Corn cobs are valuable as food for stock, and should not on any account be wasted. I have been accustomed for years to have all mine carefully salted, and ground during the winter season at a neighboring mill. To this I add about one hundred and twenty five pounds of Indian meal and a little salt. Cattle soon become exceedingly fond of it, and grow more rapidly than they would on corn meal in its pure state. It is better boiled than raw. The chaff of wheat, rye and oats is also kept, and occasionally mixed with the corn cob meal. When fed, it should always be in a wet state; otherwise the particles are apt to get in the animal's eyes, causing inflammation, &c. Twenty pounds of corn cob meal will, when cooked, yield ninety pounds.

Prof. Mapes made some remarks on the use of corn starch as a food—thinks that the whole grains ground to meal is far more wholesome. Millions of bushels of corn are now used for the manufacture of corn starch—Kingsford's mills, at Orange, do it on a great scale. The press described the process.

Mr. Van Wyck—According to one of the last reports of the Patent Office of the statistics of the crops of the nation, Pennsylvania stood highest among the Atlantic States, north of the Potomac, for Indian corn—New-York next. The average yield, it was thought, of the former State, would be fifty bushels per acre, or near it. This is certainly a great average yield for so large a State At a former meeting of this Club it was stated, that the probable average yield of Dutchess county, of this State, this year would be from 30 to 40 bushels. From this, it is thought, that the State may be safely put down at from 25 to 35 bushels the acre. It was also stated, that the corn crop of Dutchess county is greater than any county of the State—so is her oat, grass and hay crop, the number and value of her stock and domestic animals greater, except two counties, which go a little ahead of her. This makes a market at home for sustaining and fattening animals, which generally, with the manure gained thereby, gives a greater profit than selling the feed in the raw state.

I should like to know why chemists, who stand high, differ so much in their results in the analysis of Indian corn. Payen and Playfair, two eminent chemists of Europe, analyzed some specimens of corn of American growth. The first gentleman made 100 parts yield 28.4 of starch, fatty matter (oil), 35.6—and the second, protien 7, fatty matter 5, starch 76—neither made albumen, gluten, phosphate, specifically as such. Dr. Jackson, of Boston, who stands high as a chemist both in Europe and America, says, "that the relative proportion of phosphates in grain depends on the assimilating power of each species or variety. An ear of corn being selected, which had on itt wo different varieties, viz., the Tuscarora and the sweet corn, more than double the amount of phosphates were obtained from the latter than the former, notwithstanding the kernels came from the same ear, grew side by side from the same sap, and were derived from the same soil." Dr. Jackson found a greater preponderance of phosphates in Indian corn than in most other grains, as wheat, rye, barley, &c. This explains a pretty important fact, that the more highly phosphatic grains are, the more apt they are to surcharge the system of adult animals with bony matter, often producing concretions of phosphate of lime like those resulting from gout. It is thought that stiffness in the joints of horses, and lameness of their feet, commonly called *foundering*, when fed too freely with maize, is caused by the preponderance of the phosphates. If this be true, young animals cannot fail to derive more bony matter from corn than any other grain.

As to the reports of the Patent Office on the products of our soil, and the other branches of the industry of our country, it has been intimated here to-day that these could not be relied on —there are errors in them no doubt, as there must and will be in everything of the kind. What shall we do? We have no other means of procuring them for the whole nation, from any other quarter, as reliable. Agents are employed and paid by government to collect and return all the facts relating to them at the proper official depots at Washington; and if we use any we must use these. Individuals sometimes make partial reports for their own convenience, and which can afford none or very little

national accommodation, and may contain, and no doubt often do, errors also.

Mr. Greeley asked Professor Mapes as to the peculiar nutriment contained in Indian corn.

Professor Mapes replied, as he had before, as to the strong character of it as a food. He said, as to nutriment we all eat too much—we ought not to feed to fatten ourselves like oxen, and make ourselves subject to apoplexy.

Mr. Greeley—I do not think we have much benefit from this corn starch.

Professor Mapes—But people will eat the starch who will not eat the corn. I prefer that mothers of the United States should eat pure Indian corn, it is so much better for them and their children. The corn starch for some delicate dishes, the pure corn for the great markets, and of it we have more than we can swallow. We can make gum of the starch—British gum—so called—so important for calico; roasted starch forms that gum, of incalculable value.

Mr. Greeley—I have examined the great corn starch manufactories of Oswego and the West. I wish to show that the starch is inferior to the pure corn for nutrition.

Judge Van Wyck to Professor Mapes—Why are the differences in the analysis of corn so great as they are?

Professor Mapes—Because Indian corn from different soils varies much in its constituents in the same kinds of it. Best seed should be selected always, the missing ingredients of the corn crop should be given to the land. In that way we can always make corn as Mr. Pell does; he never fails; and the quantity of pure corn can be increased to one hundred bushels instead of forty bushels of less perfect corn. Some say it, but I deny that Indian corn contains any superphosphate of lime at all! Some of the ingredients, if added to the soil in a very dry, hot season, will fail, for they demand the help of water.

Mr. Greeley—Can you get Indian corn without the phosphate?

Professor Mayes—Feed a child on arrow root, which has no phosphate, and no proper bone can be formed, the infant will become rickety. Cattle understand this. You put phosphate on parts of your grass land and the cattle will stay there and bite as long as the least bite can be bitten; they never leave it for the long grass in the fields, where there is no phosphate, until all the other is gone, and then, with reluctance, they eat the long grass.

Mr. Ross—Can you then deprive the sugar cane of its sugar?

Professor Mapes—Yes, sir. It can be made, by improper culture, to yield imperfect sugar, what we term weak sugar, the crystals of which are all truncated, and the sugar approaches grape sugar. Lavoisier, Braconnet and others have made sugar, you know, from linen rags. I have made it from starch and linen. The Professor here described the chemical operation. From sixteen ounces of linen we can make seventeen ounces of grape sugar, the same as that exuding from raisins, not crystalizable. You can carry crystalized sugar back by churning it for fifty hours, and it will never crystalize again; you make molasses of it. The color brown, assumed by light-colored juice, is owing to the rapid oxygenation when it is exposed to the air. Take and squeeze it quickly in a powerful toggle joint, and the juice is, for a few moments, white, and of a different taste from cider flowing from apples crushed in a mill, slowly turning brown by the oxygen. No crop of vegetables can be perfect unless the land where they grow gives them all the ingredients which they require; and modern chemists can now give them all they demand.

Mr. Scott asked the Professor if a plant will take too much of an ingredient.

Professor Mapes—Yes, sir, they do when we stimulate them, but where all is right in and about the plant, you may use the whip, and yet the plant will keep all right.

Mr. Solon Robinson remarked, that our practice of hilling up corn came from England, where the wet climate renders it useful to plants, while in our own clear, dry, hot seasons the plants do far better by being, at least, on the general level of the soil if not below it, so that a diametrically opposite practice to that of Eng-

land is necessary here. I have no faith in the stories about the average yield of Indian corn in Pennsylvania. Why, sir, the average crop per acre of the whole United States was not twenty-five bushels, when, by proper cultivation, it would reach seventy-five bushels an acre! This perpetual boasting of our great crops has an injurious effect, for the strangers who travel among us see plainly the very slovenly way in which we manage crops. We very often see corn fields that do not measure fifty bushels an acre, cob and all, and yet some of us call it fifty bushels of shelled corn. Sir, half the corn crops of the Southern States do not average ten bushels of shelled corn an acre!

Professor Mapes was satisfied that the average crop of Indian corn in the United States was not over twenty bushels per acre.

Rev. Joseph Carter, of Brooklyn—I have seen much of the corn planting in our far west. It differs most widely from ours. If we should cultivate here as they do we could hardly get seven bushels of corn per acre. They plough about *one inch deep*, turning over the thin slice of sod about two feet wide. One man drops the seed just under the sod. The air and heat of the sun completely destroys the sod. They make their rows of corn four feet apart. They use no after culture. They have a great growth of corn. I have known some farmers at the West who cultivate eighteen hundred acres. They use the cultivator.

Hon. Horace Greeley—I don't believe that the average of Indian corn per acre, on this side of the country, is quite 25 bushels an acre, and I have seen much of it. In great numbers of corn fields I have seen the weeds more abundant than the corn.

Mr. Solon Robinson—I have seen many fields of corn miles in extent, full of weeds; the cockle-bur, the Spanish needle, rising far above the corn; such enormous masses of weeds that I rather think Mr. Greely, as well as I, could scarcely see the corn at all. Some of our Southern States yield ten bushels of it per acre. The average of the United States is not twenty-five bushels.

Professor Mapes—Not twenty.

Mr. Robinson—All Pennsylvania, in her best seasons for corn does not average thirty bushels an acre. If their eyes could be

opened to the present advancement in *corn knowledge* they could raise vastly more.

Professor Mapes invited the club to appoint a committee to visit his farm at Newark, at 9 o'clock A. M., on Friday next, to witness the operation of Gibb's Spading Machine. The Professor thinks it likely to prove a great cultivator, spading rapidly by four feet wide, and fifteen inches deep, as fast as oxen can draw it.

Mr. Robinson believed, that in this machine we have, at least, the nucleus of a capital new style agricultural implement. In all ploughs the sole and the land side compress the soil, and consume half the power besides.

Messrs. Edwards & Small, of 49 Broadway, sent for trial compressed vegetables and fruits of the Paris Masson process, conducted by Chollet & Co. As a succedaneum for fresh vegetables on long voyages, and as preventives and curatives of scurvy, they are excellent. They are compressed as hard as wood, and when kept perfectly dry cannot decay.

The Chairman appointed, as the committee to visit Professor Mapes and the Spading Machine, Messrs. Horace Greeley, Solon Robinson, Coleman of Brooklyn, Meigs, Hon. R. S. Livingston, Rev. Mr. Carter and Professor Hooper of Brooklyn.

Mr. George Shorey asked the opinion of members of apples presented by him. The club thought them good, fair specimens of a sweet apple. Name not determined. None such among the Glover models of the Institute.

Main subject, "*Fences,*" proposed by Mr. Robinson.

Members will remember to bring grafts, seeds, cuttings, &c., for distribution and exchange. Some of Mr. Pell's fine fall pippin grafts will be on hand.

The Secretary regrets that he has lost some of the most highly valuable remarks of Professor Mapes on Indian corn, by relying on a report from a professional Stenographer. They were the

most excellent the Secretary ever read or heard on the great American native grain. The club adjourned till Tuesday, April 18, at noon.

H. MEIGS, *Secretary.*

Tuesday, April 18, 1854.

Present—Judge Livingston, Solon Robinson, Berriam of Illinois, Professor Mapes, Mr. Elliott, Mr. Bullock of the Banner of Industry, Rev. Mr. Center, Professor Hooper and Mr. Coleman of Brooklyn, Judge Van Wyck, Mr. Lodge, Mr. Scott, Mr. Judd, Mr. Mundy of Metuchin, Jersey. General Chandler, Mr. Lowe, Col. Travers and others. More than thirty members in all. Hon. Robert Swift Livingston in the chair. Henry Meigs, Secretary.

The Secretary read the following papers prepared by him, viz.

INSECTS IN PLANTS.—(From Balfour.)

Ear-cockles, purples, or *peppercorn* is a disease affecting, specially grains of wheat. The infected grains become first of a dark green, and ultimately black. They become rounded like small peppercorns (hence its name), but with one or more deep furrows on their surface, the glumes spread open, and the awns become twisted. The blighted grains become full of a moist white cottony matter, which, when moistened and put under the microscope, is seen to consist of a multitude of minute individuals of the vibrio tritici, or eel of wheat. The animalcules deposit their eggs in the ovary, and their young are hatched in eight or ten days. Henslow calculates that *fifty thousand* of the young may be contained in a moderately sized grain of wheat. This vibrio retains its vitality long; it will remain in a dry state six or seven years, and then when moistened with water revives.

Cellular Structure.

The formation of cells from nuclei, and their fissiparous division (fissiparous—the part separated lives), are by some attributed to different electrical currents excited by the chemical actions going on in the cell. Cells are produced with great rapidity, especially in the case of fungi. Lindley calculates that the cells

of bovistagigantea (a fungus) have been produced at the rate of more than 66 *millions in a minute*, and Ward noticed a similar occurrence in phallusimpudicus.

For interesting information on these points vide Schleiden's Phytogenesis (origin of vegetable growth), and Mohl on cells, Maezeli also.

The cells often contain crystals of various figures; the crystals in rhubarb cause the roughness to the taste.

POLLEN—(From Balfour).

The length of time during which it retains its vitality is very different in plants. Gaertner says that in some species of Nicotiana (the tobacco family) the pollen retains vitality only forty-eight hours, that of Datura (of the potato family) the same, of Candollea one year, of Datepalm more than one year, and of some palms, and of the Chamærops humilis (of the palm family) more than eighteen years.

Nearly all botanists agree in the existence of tubes proceeding from the pollen, instrumental in reaching the ovules of plants. As to hybrids, the pollen of one species will fertilize the ovules of another, producing plants strictly composed of the properties of both plants, as mules are of the horse and ass. Some very analogous plants, however, will not mix, such as apple with pear, gooseberry with currant, raspberry with strawberry. Hybrids do not perpetuate themselves by seed, and if not absolutely barren at first, they usually become so in the second or third generation. Hybrids may be fertilized by the pollen from one of their parents, and in that case the offspring takes the character of that parent. Hybrids are abundantly produced to obtain very choice flowers and fruits, and the plants are propogated by cuttings. In this way beautiful Roses, Azaleas, Rhododendrons, Pansies, Cactuses, Pelargoniums, Fuchsias, Calceolarias, Narcissuses, &c , are produced. The size and color of the flowers are improved, tender plants are rendered hardy, and the flavor of fruits heightened.

CARPOLOGY, OR FORMATION OF FRUIT.

Fruits may be formed by *one flower* or by *several flowers* combined.

Time of maturing—ripening in some plants and fruits:

Grasses,..... from 13 to 45 days.
Raspberry, strawberry, cherry,..... 2 months.
Roses, white thorn and horse chestnut,.... 4 do.
Vine, pear, apple, walnut, beech, plum, nut,
almond,..... from 5 to 6 months.
Olive, ... 7 months.

DEPTH OF PLANTING.

[By Petri.]

Seed buried,	½ inch	deep, up in	11	days,	7-8ths of them.
	1 do	do	12	do	all of them.
	2 inches	deep, do	18	do	7-8ths of them.
	3 do	do	20	do	6-8ths do.
	4 do	do	21	do	4-8ths do.
	5 do	do	22	do	3-8ths do.
	6 do	do	23	do	only one came up.

The rays of the sun furnish light; those nearest the yellow are remarkable for impeding the germination of seeds; while the red or heat giving rays are favorable to it, if plenty of water is present; while the blue rays, or those concerned in chemical action or *actinism* (from the greek *actin*, a ray) accelerate the process and cause a rapid growth. His experiments were making the sunlight pass throught colored glasses upon the vegetables. He thinks that blue glass in a conservatory will prevent scorching of leaves, and that red glass will increase the heat. He says that a pale green glass, made with oxide of copper, is best fitted for conservatories, green being a compound of the yellow or *luminous* rays with the blue or *chemical* rays. A delicate emerald green glass has, at his suggestion been used in glazing the large palm house at Kew.

COLORS OF FLOWERS.

Those of the common pink Phlox are light blue early in the morning, and afterwards bright pink, as the sun advances. Those of the Œnothera tetraflora are white in the morning, and red at

noon. Hibisca variabilis, flower white in the morning, pink at noon and red at sunset. The bracts of Hakea victoria are yellowish white the first year in the centre; in the second year, a rich golden color; the third year, a rich orange; the fourth year, a blood red; the green portion of the bracts become annually darker.

Revue Horticole, Paris, June, 1853. Translated by H. Meigs.

CAMELLIA—ITS CULTURE AT KAZAN.

A letter from Boutleroff, Adjunct Professor of the Imperial University of Kazan, April, 1853. (Kazan is on the river Kasanka, about four miles above its fall into the river Wolga, in latitude 55° 47′ 26″ north, longitude 49° 21′ 9″ east.)

I send you some information as to our method of cultivating the camellia The composts which we use differ from those used by your Mons. Leguay. We have none of his heath soil, and we replace it by soil formed of pine leaves, well mixed with sand. My experience proves that the camellia roots very well and promptly in a compost soil made of earth of leaves, muck and sand. Night soil in solution is moderately added.

Camellia cannot be transferred to new pots successfully, except immediately after flowering is over and before the spring growth begins, or towards the middle of summer, when the sap is stationary.

We cultivate several varieties of the camellia here, and others of the temperate latitudes. They give us well developed flowers, but we never prune them as we should do. I regard it as a necessary for this charming tree. I regret that Mr. Leguay has not yet gone into the the practice of budding the camellia, and other methods of multiplying a plant so interesting to amateurs.

From the same Revue.

DISEASES AMONG NUT OR STONE FRUIT.

Last year Mons. Leveille pointed out this malady, and this year shows its attack on our cherries. Those of many gardens, after having blossomed well, and formed their fruit, apparently in a sound condition, were all at once killed, either partially or com-

pletely, at the moment when the nut or pit was being formed. On examining the branches we found the pith turned black, with a sort of vegetable gangrene. Prunes also were partially attacked in the environs of Paris, same as the cherries. At Montreuil many peaches were destroyed in the same way.

Prof. Mapes said, it appears by the last census that we had then 118,000,000 of acres of land in cultivation. It is a fair calculation to assume that this land is divided into an average of twenty acre fields, and that the labor of fencing, exclusive of the materials, is worth 50 cents a rod. This would be $113.25 for every field, and $670,766,273 for the whole, the simple interest of which will astonish any man who will make the calculation. This is a monstrous tax upon industry, besides the loss of land upon which the fence stands. I don't know how it is with others, but I cannot afford to lose the use of a strip six feet wide. Fields are cut up into small lots just from custom, without any reason. Cattle are permitted to run into the road by custom; no law sanctions it, and no Legislature dares to make such a law. I cannot afford to pasture cattle, because it is cheaper to soil them; it may not be everywhere, but that is a subject for calculation. No one can afford it, unless upon very low priced lands. Osage orange hedge is becoming very common in some places, but that is a matter of calculation whether it can be afforded. Mr. Randall told us here the other day that he has long lines of it upon his farm in Maryland, but is obliged to run a cutting plow alongside to keep the roots within bounds, as the roots run out twelve feet each way. I believe this kind of hedge will make a good fence if you can afford the room. Stone walls may be built profitably in some places, by making an underdrain under the wall. All walls should have a ditch filled with cobble stone, to prevent the frost heaving down the wall. Wood posts for fences should all be kyanized at the bottom, or set reversed from the way they grew, with corrosive sublimate plugged in the upper end. It is best to kyanize, and not so expensive. The sleepers of the Camden and Amboy Railroad were kyanized, and have lasted twenty-three years. The wood treated with corrosive sublimate never shrinks and

swells or cracks. The best way to char posts is to wet them with cheap resin oil and burn it off. Copperas about posts in the ground preserves them. Wire fence has not yet answered the expectation. I commenced early, and do not like to give up. I still hope that some plan will succeed yet. The difficulty is to provide against the contraction and expansion of the iron. The best way to paint wire fence is to take gutta percha which has been treated with white lead, and heat the wire with a lamp and rub on the gutta percha, which will adhere to the hot wire, and the white lead will give it the right color. Cattle on the road are a public nuisance, and no decent farmer in this age will be guilty of so great an outrage upon his neighbors as to turn out his stock to steal their living. It is actually a system of robbery, and there is a sort of mawkishness about people hesitating to abate the nuisance by legal means.

The subsoil plow exhibited by Prof. Mapes, and tested before a committee of the Farmers' Club on the farm of the Professor in New Jersey, proved entirely satisfactory. It is, indeed, the only subsoil plow I have ever seen that would do its work effectually, and at so small a cost of power. A small horse hoe or cultivator was also tested, and proved very successful.

The Rev. Mr. Carter, of Brooklyn, observed, that some years ago he thought it well to try hedges here instead of our post and rail and stone wall, and sent to England for twenty thousand of the hawthorns—made proper furrows to plant them in, in double rows, each plant being opposite to the interspace of the plants in the other row. The rows were two feet apart and the plants six inches from each other in the rows. Some years after, these hedges were much admired. I have made a fence in this way: two rails, with holes bored through them four inches apart, and large enough to admit round pickets of about the size of our common broom handles; three such pickets to the running foot of rail, eight posts to every hundred running feet of the fence. The pickets cost me but one dollar a hundred, and the boring of the holes twenty-five cents a hundred. All the cost, when complete was five dollars and thirty-six cents a hundred. I placed the

planks at the bottom of the pickets. I had this fence made in wet weather when farm work generally could not be done by my men. I have also tried iron wire fencing. I set posts on the desired line, or select a tree if on the line. I stretch the wire from one outer post to the other, and then set the intermediate posts to exactly touch the wire. I then drive a wrought nail into the head of the post under the wire, and then clinch the nail upward over the wire to hold it in its place. I stretch, then, four other wires below the first, all of them are stretched tight enough to be *musical*. I used *wire No.* 9. The posts were seven feet apart, the fence was strong enough to keep the cattle in or out—a cheap fence. The iron was annealed, that is necessary to render it sufficiently soft.

Mr. Solon Robinson proposed, as a subject for the next meeting, "Weeding, and the cultivation of spring and summer crops, and the best manner and best tools to do it." Adopted.

Mr. Coleman, of Brooklyn, exhibited his model fences and fence beehives, and made full explanations of his method of making and setting them. He uses three rails, bored at such angles as are necessary to preserve the vertical position of their pickets in all inclinations of the land. The pickets are turned to an exact diameter and length, and pointed. His machine turns out *ten such pickets in a minute*, or one thousand feet in ten hours. They, the pickets and rails, cost him one dollar the ten running feet. A man, with two boys to help, can make five hundred feet of my fence in one day. Cedar posts are desirable if we can get them cheap enough. In adjusting the perpendicularity of my posts and pickets, I use a plummet level, which is necessary, as any variation from the perpendicular offends the eye. Mr. Coleman remarked on, and exhibited by his model fence, the great facility as to gates anywhere from a gate twenty feet wide to one of only two. As a movable fence for pastures, nothing can be more convenient. It is only necessary to draw out a picket at each corner of the proposed enclosure, then placing the end holes of the rails under each other, and passing the picket through, so forming a hinge, enabling one to set it at any angle you please. Mr. Coleman showed a map of his Maryland farm, on which he has di-

vided the whole into twenty acre lots. Reference was made to the remarks of R. L. Pell, of Pelham, on fencing, contained in the Transactions of the Institute for 1851, page 186.

Mr. Berrian, of Illinois, remarked that some picket fence had been made there; pickets square, and made for 25 cents a hundred. He presented an Illinois apple, which the members tasted of and thought it a pleasant tasted one, inclining to be mealy. It is called the greasy pippin, on account of a sort of greasy feel about it. It is best for the table in December.

The Club adjourned to Tuesday, April 25, at noon. Subject—"Weeding, and the cultivation of spring and summer crops, in the best manner, and the best tools to do it with."

Members are requested to bring, for mutual benefit, some of their best grafts, cuttings and seeds.

H. MEIGS, *Secretary.*

April 25, 1854.

Present—Professor Mapes, Judge Scovil, Chester Coleman of Brooklyn, Mr. Amos Gore of Jersey, Berrian of Illinois, Dr. Leavitt of Marcellus, Mr. Porter of Jersey, Solon Robinson, Judge Van Wyck, Samuel Fleet, Colonel Travers, John Randel, jr., Professor George E. Waring, jr., Messrs. Pardee and others; upwards of forty members in all. Mr. Coleman, of Brooklyn, in the chair. Henry Meigs, Secretary.

The Secretary read the following papers translated and prepared by him, viz.:

[From John G. Adams, M. D. La Patrie, March 7, 1854. Revue d'Agriculture. Extracts.]

A very serious fact occupies the attention of the wine growers relative to the distillation of brandy from the wine and marc (marsh) of the grapes. The distillers see, with great alarm, the recent large distillation of alcohol from beets. Within the last two years great competition has arisen by alcohol from the beets, and from molasses. But we think that there is no good reason for it in the Southern departments. It is true that those of the

North, the market is always open to the alcohol from the Southern and Southwestern provinces. The sad influence of the grape malady has, since 1852, much diminished the distillation of brandy, so much so as to have increased the cost of the hectolitre (22 gallons, and about 1-10) from 50 or 60 francs to 215 francs, *i. e.*, from $10 to $43. This price causes the beet sugar makers to go to distilling beets. Mr. Dubrumfant, of Bercy, made great improvements in the process of distillation, by which 41 litres (a litre is a pint and nearly 8-10) of saleable alcohol is made from 1,000 kilogrammes (a kilogramme is 2 pounds 3½ ounces avoirdupois) of beets, which, in the ordinary making of sugar, gives 50 kilogrammes of sugar, so that the distillers make from 80 to 85 francs in alcohol, and but from 60 to 65 francs for the sugar. This explains the reason why 33 distilleries in the Northern departments have already been established. Dubrumfant had a patent in the autumn of 1852. Before that time the custom was, after preventing the sugar juice from fermenting, to change the whole of the crystalizable sugar into uncrystalizable sugar by yeast, to change the sugar into alcohol. Dubrumfant contents himself with the effect of the natural fermentation of the beet, and when too much sulphuric acid has been poured into it he can saturate the excess by adding chalk.

But, however, this alcohol from beets cannot be maintained in competition with brandy when the grape malady ceases. This is certain, and besides the *beet rum* will never equal in quality the *extract from wine*; nor can our agriculture, furnish 1,000 kilogrammes of beets at the price of 16 francs, and generally from 11 to 12 hectolitres of wine, give from 110 to 120 litres of brandy. We have reason to believe that the high price of brandy is but temporary like the disease which troubles the vines. Certainly the beet, whose culture in France was proposed by the Abbé Commerel about 100 years ago, as a plant of great importance to our welfare, is so now understood, and also that we now should go largely into breeding cattle.

[Extracts by H. Meigs. The Journal of Agriculture. Boston, April, 1854.]

Mr. King, one of the editors, has a letter from his correspondent in Oregon, stating that a strange and beautiful tree has been

discovered in Washington Territory, not known in any other part of the habitable globe. It is destined to make some noise in the world. It has great beauty of fragrance. It is from one foot to seven feet high. The leaf resembles that of the pear, the trunk and branches like the orange tree. The upper side of the leaves are coated with a gum, which, as well as the bark and the leaves, are highly odorous, and, like the bergamot, some thought the perfume was like ripe pears, others like ripe apples. The flowers are like jessamine. It is an evergreen.

In the Horticultural Review of Cincinnati, conducted by Dr. Warder and James W. Ward, Esq., for April, 1854, we find several interesting articles, and we recommend it to our friends. An article on the pear blight by our amiable and intelligent friend, A. H. Ernst, of Spring Garden, Cincinnati, deserves a reading. One on the fig by Warder, another on the banana by the same.

Christon Coleman—Mr. Chairman, before the club shall have entered upon the subject of discussion for the day, I shall be glad (by the indulgence of the club) to advert for a few minutes to the matter last under consideration, viz., that of fencing, for the purpose of showing the adaptedness of the machinery (used in the manufacture of fencing, models of which were exhibited at the last meeting of the club) to many other purposes, among which might be named that of making ladders of every size and length used on a farm for gathering fruit, &c., but more particularly that of making fodder racks for all kinds of stock feeding. But before I proceed to illustrate the construction of these hay and fodder racks, I will exhibit a figure of the kind of cattle shedding to which they seem peculiarly and advantageously adapted, not only as regards the protection of cattle from the influence of the weather during all seasons of the year, but particularly in the accumulation of barn-yard manure, and in securing it from waste. Here is a figure of a Pennsylvania and Maryland Switzer barn, and here is another of a New England barn, which I presume will be recognized by any one who has seen either or both—to both of which, however, the shedding to which I allude is alike applicable—the roofing of which should be sufficiently extensive to cover

as much space as is requisite for a sufficient range for all the stock of every kind designed to be kept upon the farm. Beneath this roof should be suspended as many of these racks as will comfortably accommodate the entire herd, small and large. In this way, when feeding from them, filled with hay or fodder from above, the younger and weaker part will always see, and thus be apprized of the approach of the stronger and more authoritative portion of the herd, and make safe their retreat. This space receives the deposits of all litter, straw, &c., from the barn, as also the cleanings from the stables, which should be equally spread over the entire surface. As the mass accumulates the racks should also be raised, so as to preserve a convenient height from the surface at all times. Here is a shelter inviting to cattle at all seasons—a protection from the snow and cold of winter as well as from that of sun and rain in summer—consequently all their voidings are preserved. The eaves of the entire buildings should be so thoroughly guttered as to carry away all the water that falls in rain, except such as may be needed at any time to keep the mass of manure sufficiently moist to promote decomposition. The ground beneath should sufficiently slope towards the centre of the space so that all the superabundant water in the mass will there gather into an excavation sufficient to receive it, into which a pump should be placed, of sufficient height as will at any time throw it over the surface of the mass, when needed for additional moisture. Whenever ammonia is discovered to be escaping by the decomposition and heating of the pile, plaster should be liberally sown over the surface, or dissolved refuse salt (chloride of sodium) or fish brine may be liberally sprinkled over it, sufficient to arrest all smell of escaping gases. What farmer, whose manure heap is not protected from the open weather, is not compelled, after every shower, during the time of this exposure, to see a dark coffee colored stream coursing its way from his barnyard, perhaps down a short declivity to a neighboring brook, discoloring its already turbid current as far as the eye can trace its course. Perhaps the sensible farmer may be thinking that his manure heap may be greatly benefited by being washed so clean. Or if he sees his manure pile emitting steam of so pungent a smell as to

forbid his approach, he may be thinking, perhaps, that when his heap only gets rid of such a disagreeable odor the manure will be first rate; and as he does not see the straw and solid matter rising towards the clouds, no one need undertake to convince him that his manure is not all there.

THE POTATO DYING OUT.

By John Bullock, editor of the Banner of Industry.

In examining the statistical reports with respect to many of the agricultural productions of the country, we are impressed with the belief that they are passing away.

Nations, races, creeds, diseases, and agricultural products, alike would seem to rise, prosper, become dominant, and then die out. We are all familiar with the rise, progress and decline of nations and races, each presenting some peculiar feature which has given it strength and power, but which also contained the seeds of its death.

It is so with human disease. Some of those fearful epidemics which, like the plague, have passed over nations, spreading death and terror, are now entirely gone We have no knowledge of them except in history. In their places we have other diseases which were unknown to them, and which, we doubt not, will be unknown a few centuries hence. Among these are the cholera—which has already been reft of half its worse effects—and that disease which attacks the devotees of pollution.

The potato has been known as a general article of commerce and food for less than three hundred years. Humbolt thinks that it originally came from Chili, where the Indians cultivated it under the name of battatas; it may have been brought by English travellers to Virginia and Carolina. It is stated that Sir Walter Raleigh took the plant from America to Ireland as a curiosity. He certainly could not have been aware of its value as an article of food, for when he saw the plant he directed his gardener to dig up the "weeds." It is argued that from those potatoes Europe was mostly supplied. In a short time its culture was advocated on the ground that it was a root which would sustain life, and

that if extensively cultivated, when the grain crop failed the people need not starve. By and by it was thought to be good food for "poor people." It kept on growing in favor, until it has become a staple article of food in all Europe and America, and is making its way into Asia.

The diseases which have recently beset the potato, and which have baffled the efforts of the most learned to cure, to our mind indicate most clearly its death as an article of commerce and general consumption.

Mr. Coleman exhibited his rails placed in various forms, as fodder racks, fence, &c., showing the ease and simplicity of those various forms, the rails being so exactly bored by machinery, and pickets turned in a lathe to exact fitness for the holes.

The Chairman called up the subject for the day, "Weeding, spring and summer planting, and the best tools to do them with."

Colonel Travers remarked that he had always used the hand and the hoe for weeding, and had come here, hoping to learn better methods if there are any. The cultivator of the Professor works well I believe.

Professor Mapes—It is not of my invention, sir, but it is a very useful one.

Mr. Meigs said, that he had tried a new mode of weeding thirty years ago, among certain drill crops, onions more especially. I found that by the old practice that of pulling up the weeds and surplus onions in the drill, I too often disturbed the roots of the onions which I wanted to leave; and it occurred to me that pushing down the weeds and surplus onions was an easier and better plan. I then, first, with a proper steel hoe as sharp as a knife, cut the weeds within about an inch of the young onions through all the drills. I then pushed down with my fore finger, as deep as the hand, all the weeds and surplus onions in the drills, hauling the earth into the holes on top of the weeds and onions. By that method I obtained a crop twice as good as in the old way. My experience teaches that plants are violent enemies of others and of their own kin. They cannot bear to be overtopped or

touched by others. No plant, even of the largest crop, should be crowded in the least if you want the greatest crop, the finest and the most healthy that can grow.

Professor Waring—Your method, perhaps, contracts the soil too much.

Mr. Meigs—Not so, I never had my garden beds pulverized less than two spades deep, at least eighteen inches deep. I raised Baden corn 16½ feet high; stalks seven inches in circumference at the bottom, and averaging five stout ears on each stalk. Dr. Mitchell used to compliment me on my productions. I have raised rice, Sea Island cotton, and almost everything else on this island. I made proper hotbeds to commence in February with such as required a long summer. In that way I raised new sorts of potatoes from the balls, one of which proved excellent for many years, and then followed the example of some of their Mercer kin, becoming black at heart.

Mr. Solon Robinson—Mine may be deemed by some folks to be a very queer notion, but my notion is, however, that the very best way to *get rid of weeds* is *not to raise any!* Why do we cart on and cover our fields with the barn yard manure full as it can hold of seeds? Why not take a basket of weed seeds and sow it broadcast? We do just as bad as that with our eyes wide open—no, sir, *shut* I mean. We allow streams of rich fluid manure from our barn yard to reach the field. What better mode could you adopt for a rich weed crop than to manage it so that every part is thoroughly drenched in and coated with the very manure? Why not compost all the manures as Professor Mapes and some others do, that the vitality of every part is extinguished before the compost is put upon the field. You must not therefore use his compost to raise weeds; he kills every seed that gets into it. What a practice adverted to by the Chairman, that of draining the life out of the dung heap and then casting the useless leavings upon the land, all the ammonia gone off in those clouds of smoke you see continually rising from your dunghill! Whoever heard of a seed found alive in the guano beds? or in the phosphates or improved superphosphates of lime? There are, to be sure seeds found at various depths in the earth.

Professor Mapes—Yes, they have been brought from the greatest depths, and yet possessing vitality.

Mr. Meigs—Yes, but unless they are within less than one foot of the surface they cannot grow.

Professor Waring observed, that great improvements are already made in our cultivators, and still further are expected to be made. I beg to call attention to the subject of the excrementitious matter thrown off by plants; for instance, if you plant turnips upon land infested with witch grass, the excrementitious matter of the turnip will kill the grass, &c.

Judge Van Wyck—The destruction, or avoiding the growth of weeds on a farm, especially the most noxious ones, is certainly very desirable. One way, and a good one, is to avoid sowing them as much as we can, either through the grain we sow, or the manure we spread upon the land. The first may be effected by clean seed, the last by proper management of the manure heap, according to Professor Mapes' plan, decomposing and rotting the seeds, and improving the manure also. Let us manage though as we will we cannot get rid of them entirely, and some good farmers and gardeners that I know have often told me that by working them into the soil, by plowing, hoeing and spading, grass and weeds of almost all kinds well covered will make sometimes the best manure. This, too, on the spot where they are wanted, without the labor of carriage and spreading. I wish to say a word or two on the first branch of our subject—*farm fencing*. The plan of throwing aside all fencing as a great and unnecessary expense I do not think will suit our country generally, at any rate not for a long time to come, and perhaps never. Cases of it may exist in different sections of our wide-spread land, but they do not, nor will they increase to any extent. Come to inquire also into some of these cases, we almost always find some circumstances peculiar to the farm and neighborhood where they exist, and which may be said to have been so strong as to have compelled their adoption. To the South and West we know, or have heard, of a few plantations that have discarded fencing, the reasons for it appear to have been their great size, from one to four or five thou-

sand acres, and the great scarcity of fencing material, the quantity wasted, and the distance this was to be had and carried for use, made it too tedious and expensive an operation. Two or three adjoining farms in a similar state would aid each other in the plan by keeping their stock about their buildings with a small quantity of fencing material made for mutual convenience. Other planters and farmers have told me that they did not keep slaves as such, they sometimes hired them as they did other laborers; but this is always very difficult to the South, you cannot get them hardly at any price, white or black, in the numbers, and where you want them, for large farming operations, like fencing, and with materials brought from a great distance. Others who have plenty of fencing materials near them, and who use it, by dividing their farms into lots for keeping and grazing stock and other purposes, say they can do this much cheaper and with less labor than by throwing their farms open, and raising the feed and carrying it to their stock when confined about their buildings. The cattle, they have assured me, are healthier by plenty of exercise in the open air, choosing their own feed, drinking when they please, and the land kept in as good, and, perhaps, better state. Our farmers North, on sections of the country that I am best acquainted with, would not listen to the system at all, or entertain the idea of putting it in practice for a moment, although the small size of their farms comparatively is better fitted for it. These say at once they would rather see and have the benefit of their rickety, crooked worm fences than adopt, or think of adopting, the *rickety, crooked system of no fences at all.*

Mr. Scott—We know well the loss by the great growth of weeds along our fences, as well as the uselessness of the large amount of land they cover. Fences should be dispensed with, and the stock kept under control. In the Lothians of Scotland there are no fences. (The Lothians is a name common to three counties of Scotland, viz., Haddington, Edinburgh and Linlithgow shires. East Lothian, or Haddingtonshire, bounded east by the German sea, is one of the most fruitful counties in Scotland. It is about 25 miles long and 15 wide, produces great crops of wheat and other grain, is well watered, abundantly supplied with fish, fowl, fuel, and all the necessaries of life, has many elegant

houses, people of easy fortune, and some of rank.) They are done away with speaking of weeds as farmers do. They ought to know the names of those that are most noxious. Botanists do not have weeds, all are plants to them. There is one value in weeds (plants I should say), not so much noticed as it deserves, and that is, their indications of the qualities of soils on which they have established themselves. This remark leads directly to a valuable conclusion, that is, by amending our soils with some constituent not agreeable to the weeds, they all die out. The farmer ought to take note of this, and he can rid his fields of his most troublesome weeds completely.

Professor Mapes, referring to Mr. Waring's observations on the excrement of plants, said, that if we take a cabbage, wash it as clean as possible, then put it into perfectly pure water, and let it remain there for some time, there will be found excrementitious matter produced, which, if poured upon a growing cabbage, will kill it, but if poured upon a beet will feed it well and add to its vigor.

Professor Waring made some remarks on the subject of the adaptation of soils to plants. On the succession on oak forests cleared, by pine trees and others.

Professor Mapes proposed for our next club the subject of "Summer management of farm manures."

Mr. Solon Robinson—"And what weeds are noxious."—Adopted.

Mr. Stephen Knowlton, of Clinton avenue, Brooklyn, presented to the club a bunch of Egyptian corn, grown by him last season. It was one of the finest ever seen by the members, and the grains were taken by numbers of members for cultivation. This Egyptian corn has several names. It is a bunch of grains quite close together, and in such numbers, that the Romans gave it the general name of *mille*, or *millium*—thousand; hence *millet*, or the thousand grains.—Meigs.

Subjects for next meeting, "Summer management of farm manures," and "What weeds are noxious."

Members are requested to bring and exchange with each other best grafts, cuttings, seeds, &c.

The Club adjourned to Tuesday, May 2, at noon.

H. MEIGS, *Secretary.*

May 2, 1854.

Present—Judge Livingston, Solon Robinson, Captain Holmes, Prof. Mapes, Mr. Waring, Mr. Scott, Mr. Toucey, Mr. Lowe, Mr. Lodge, and others—seventeen in all.

Hon. R. S. Livingston in the chair.

Henry Meigs, Secretary.

The Secretary read the following translations and extracts made by him during the recess, viz :

[From the Journal of Agriculture and Transactions of the Highland Agricultural Society of Scotland, March, 1854.]

AGRICULTURAL STATISTICS OF FRANCE AND GREAT BRITAIN.

The recent work of Mons. Leone de Lavergne is a valuable one. We extract from it. In his comparative views of the agriculture of England and France, he shows the extent of the British Isles to be thirty-one millions of hectares of area—equal to about seventy-seven millions of acres (the hectare is nearly $2\frac{1}{2}$ acres), or about three-fifths of the area of France, which is estimated at about fifty-three millions of hectares, or about one hundred and thirty-two millions of acres. England proper is the largest and richest part of the three kingdoms, containing thirteen millions of hectares of area—about thirty-three millions—more than a third of the extent of the British Isles, and about one fourth of the area of France. In comparing England with the best cultivated districts of France, viz., Flanders, Artois, Picardy, Normandy, and the Isle of France, there is no equal extent of land to match it. Some of our soil—as the whole of the north, for instance—is superior in productiveness to the best of England. But France does not possess thirteen millions of hectares as well cultivated as those

thirteen millions of England. The climate there and the soil are far from being superior to ours—yet France is far behind the United Kingdom in productiveness.

Sheep.—For the last one hundred years France and England have maintained an equal progress in numbers. It has doubled in both countries. In 1750 each possessed between seventeen and eighteen millions, and now each has thirty-five millions. This apparent equality conceals a serious inequality. The thirty-five millions of French sheep live on fifty-three millions of hectares, while the British sheep live on thirty-one millions of hectares. So that if we would equal the British in numbers relative to our area, we ought to have sixty millions of sheep. The wool of France is about 130 millions of pounds. That of Great Britain about the same.

But England takes the lead in an enormous ratio when mutton is taken into the account.

About ten millions of sheep are slaughtered annually in the British Isles, of which eight millions belong to England alone. Their weight equals (at the average of seventy-six pounds each) about 740 millions of pounds weight, while those of France (eight millions slaughtered) have an average of thirty-seven pounds of nett weight, equal to about one half of the weight of the English sheep. The figures, says Lavergne, are not of mathematical exactness, but are near enough to give a general idea.

France has ten millions of cattle; Great Britain has eight millions—of which England and Wales have five millions, Scotland one million, and Ireland two millions. France has four millions of cows, but three-quarters of them are not truly milch cows, and almost all the English cows are. If English cheese is generally better than French, French butter is much better than English. The English cows give about three thousand millions of quarts of milk—of which one-third feeds the calves—about one thousand quarts for each cow, while the French get but five hundred quarts for each cow.

Whole value annually of each country.

France—Beef, milk and work—about	$140,000,000
Great Britain—Beef, milk and work—about.. ...	180,000,000
Great Britain has 2,000,000 horses, worth.....	120,000,000
France has 3,000,000 horses, worth.....	90,000,000

Great Britain has better pigs, and more of them, than France, but she has no chance in poultry, compared with France, who sends out $20,000,000 worth of eggs per annum, and her fowls are worth $20,000,000—while all the poultry and eggs of Great Britain are worth only $5,000,000.

The Journal says that the doctrine now is that every farmer with 200 to 300 acres, who has not a steam engine on his farm, has a great lesson to learn.

[Minutes of the Session of the Societe Imperiale D'Horticulture, Paris, 1853—Extracts—Mons. Payen in the Chair.]

Dr. Aube repeated—That fruits which do not arrive at perfection have not been fecundated. The suppression of the stamens will render the fruit abortive in general. He recalled the practice of the Arabs on their date trees; they cultivate none but females, to whom they bring and apply the branches of the male flowers, in order to fecundate them. A discussion on this point ensued.

Mr. Bossin remarked that the Germans took away from the buds of their stock gilly flowers the stamens before the flower had bloomed, opening the buds to get at them.

Mr. Vattemare said that he had heretofore remarked that an artist in plastic substances had frequently presented to the Imperial Society model fruits executed by him with great perfection, and had promised him a collection of them for the United States, but afterwards changed his mind.

Mr. Vattemare has before announced to the Imperial Society that an American has made model fruits of a similar kind, to the number of more than 400, and that the society would find itself compensated by sending for them.

The President remarked that he could do nothing in relation to it upon his own responsibility; that he was not free to act; that it is impossible to gratify the good feeling of Mr. Vattemare on this occasion.

That gentleman did homage to the report on metrical weights and measures, of which he had sent a collection to New York, advising its adoption.

The President said that the society could not but be unanimous in according their sympathy to this project—that the adoption of the decimal metrical system in all civilized States would be an immense service rendered to international relations, because it will give the means of comprehending perfectly by all civilized men a common weight or measure, and also be greatly beneficial in scientific works.

Gerard Temguy exhibited some caulifiowers. He had sent by railroad from Morlaix to Havre, and thence to Paris, 14,000 of them. They arrived in perfect condition. He had pulled them within the last month.

In a discussion on grafting pears by Dr. Aube and Monsieur Bourgeois, the latter was of opinion that the subject had not yet been studied, and the influence on the graft and on the stock, and reciprocally of the graft on the stock. He had found by experience that the Saint Germain and the magnificent Beurre are already not good. He thinks that this subject should be carefully studied, as well as the soil and the age of the trees.

Mr. Jamin saw last fall, in a journey, a proprietor who has pears grafted on the quince for one hundred and fifty years, still bearing magnificent pears, while he had been obliged to remove all his seedling pear stocks.

Mr. Bernard de Rennes said that he had studied the subject comparatively, but had not arrived at a conclusion. He firmly believed that the seedling stocks grew best in pebbly, poor soil.

Dr Aube had examined the growth of the pear and the quince at the graft, and the growth of the two woods was sympathetic,

although the wood of the pear was thicker at the junction than the quince.

Mr. Scott—Having been present at the last meeting, when the subject of weeds was discussed, I expressed a wish, as the time allotted for that subject had been encroached upon, that a little more attention should be given to the subject, and that the relative characters of the various plants known to the farmer as weeds should be more accurately defined. Permit me here to state that in doing so I was not attempting to secure an opportunity to advance any favorite opinion, or to confuse the scientific with any botanical jargon. I am convinced, however, that even a slight addition to the botanical knowledge of onr farmers would not incapacitate them from raising large cabbages and pumpkins. It is true some of them might be induced to regard weeds with a little more consideration than they now do, and those noxious weeds called by some sentimental old ladies and impractical gardeners, flowers and plants, might become objects of interest to the neglect of corn and beans. These are all the evils that I could apprehend from a little more attention to botany as a science, or horticulture as a pleasant and elevating recreation. The preparation of muck and superphosphate are of paramount importance. Weeds, however, are plants, and we must learn something of their nature, habits and peculiarities of growth and development. The best and most direct road to this is by means of the researches of science—the study of the discoveries and experiments of those who have spent their time and means in tracking out a path for others to follow.

My object now is to offer a few remarks upon the subject for discussion, What are noxious weeds? And I cannot commence better than by referring to an item which appeared in a morning paper of this city a few days ago, relating the fact that a child had been poisoned by eating gypsum. I confess I was at first a little puzzled until I found that the gypsum poison was a plant called *stramonium* (*datura stramonium*) of botanists. This, you all know, is the Jamestown weed, so common and luxuriant around the city, and more so a little farther south, in waste lots, on ground already cultivated, but now out of cultivation. This I should at once set

down as a noxious weed—first, because it is poisonous, and unfit for a social or domestic plant, as such are sometimes termed—second, because it reproduces itself in immense numbers by its numerous large seeds, and is an annual, coming up among cultivated crops, overshadowing all less developed neighbors. On the other hand it is medicinal, being in use in pharmacy for very important purposes, and called commonly thorn apple. I may add that it has been collected in South America and sent home neatly papered up as a rare and beautiful plant of the Amazons. It has clandestinely introduced itself to almost all British gardens in the papers of annual seeds sent there. The climate, however, does not suit it, and though it vegetates and survives it never flourishes as a weed, and, therefore, is not noxious to the cultivation there. I have, perhaps, attached more importance to this individual plant than I should have done. It illustrates the subject better than by running over a whole list. You may then designate those plants as noxious weeds which are out of their sphere, that is, springing up spontaneously where they are a nuisance to the husbandman, and of so little value to the community as not to render their preservation desirable. I would class as noxious weeds—The Jamestown weed—the *Arsesmart*, vulgarly so called; the Groundset—*Senecio vulgaris;* the Common Dock—*Rumex domestica;* Purslane—*Portulacca; Ambrosta artemiscopolies* or *groundsel; Fumitory*, or *Fumaria officinalis;* Corn Poppy—*Papaver phocos*, easily destroyed by clear seed; Leguminous weeds—Chick Peas—*reum texvasporm;* Tares—Crowfoot—*Ranunculus repens; R. tuberosus acris; Sceleratus;* Wood Plants—*Chimaphiles; Pyrola monesis ; Saxifraga Pennsylvania ; Thalictrum anemonoides.*

Chester Coleman, of Brooklyn—Mr. Chairman and Gentlemen of the Club—It is a remark oft repeated, yet no less true than trite, "that the farmer's manure heap is his gold mine." It has again been called his "bank;" but, sir, if all the delvers for that substance, or all the financiers of our land, were to pursue a course as inconsistent in their operations as that of the genera. practice of farmers throughout our country, in the accumulation and in securing from waste their manure, the agriculturists them-

selves, *cum una voce*, would join in the universal chorus of ridicule, which they would as richly deserve. Why, sir, for a practical illustration, I need only to take you a very short distance on the Long Island Railroad, commencing almost in the immediate vicinity of the city of Brooklyn, when you will begin to find heaps of manure purchased from stables in the city at from six to eight shillings per single horse cart load, ten of which making a single car load, thrown by the road side, contiguous (to be sure) as practicable, to the place designed for use, where it remains several months (until needed) perfectly exposed to both sun and rain. Who does not fail to see, from the car trains in their daily and weekly transit, past these multiplied deposits, if observant, particularly after every shower, all the low places and cavities in the surrounding surface of the ground, filled with a dark colored decoction from the pile, unless, perchance, the current betakes itself to the drain of the track beside, and is seen in full chase until absorbed by the ditch itself; and, as I believe, I remarked at the meeting of this club last week, what farmer, who has his manure no better protected in his cattle yards and about his barn, is not obliged, after every similar shower, to see a dark coffee-like colored stream coursing its way, either to the gutters of the public road side, or, perhaps, over a short descent to a neighboring brook, giving its current an additional discoloring as far as it can be seen. Sir, in seeing and witnessing so frequently these things, I am often led to query what do these farmers—if they are entitled to this honorable appellation—mean? Can it be possible, if they see all the coloring matter washed away, and all the gaseous and aqueous substance evaporated by the sun? Can it be possible, I repeat, an expectation exists that their manure is all there? And even during the season of winter, as they make their morning visits to the barn, day by day seeing their heap sending up through the apex of their thick covering of snow, a pungent volume of steam, too forbidding for a very near approach—can it be possible an expectation exists that "when all this ugly smell only goes off once" then the manure will be in its best state for use. No wonder such farmers are led to exclaim when harvesting their crops, as I have frequently heard the complaint, "We don't get no more such seasons like we used to have."

Why, sir, ask these farmers why they do not purchase concentrated manures, and thereby increase at once both the fertility and the products of their soil by this means, and they will immediately reply, they "can't afford it"—"that they cannot raise from their soil sufficient to meet their current expense for labor, &c., already; and how can we safely incur the necessary expense without an adequate resource to meet it?" Then, sir, just say to them for the encouragement of their faith, "Gather and collect from every possible resource all the manure you can, then improve, protect, and save all you do collect;" and then, sir, they will soon be enabled to begin to purchase "concentrated fertilizers," and ere long they will be able to apply them additionally, as far as is necessary, and that at a net annual profit of from 50 to 100 per cent upon the investment, if judiciously managed and applied.

In the husbanding of all the manure possible upon a farm, I would adopt the language of an old couplet, usually applied to another matter, however:

"Keep all you've got,
And get all you can."

And to accomplish this the most efficiently, I know of no plan better than the one presented to the consideration of the club, with an accompanying draft also, at its last meeting, viz, that of commencing a continuous length of shed roofing, from above the entire front of the stabling, in width corresponding to the entire length of the barn, the ridge of which meeting the eaves directly under the middle point of the barn roof, and extending back sufficiently far to cover a space, or range of the yard, adequately spacious for the comfortable accommodation of all the stock of cattle, large and small, ever designed to be kept together upon the farm. The length of this shed, the width of which, corresponding with the length of the barn, should be sufficient not only to accommodate all the cattle, but also to cover all the manure that may ever be accumulated at one time upon the farm, from the influence both of the sun and rain. If the stabling of the barn, as is generally the case, should front upon the south, the western side should be closely sided up during the winter

season, as a protection to the cattle from the inclemency of the westerly and northern winds. This might be done with double gates or doors, hung at each post planted in the ground, and supporting the plate for the roof. These doors will admit of ingress and egress at any part of the shed, for the purpose of hauling in litter, muck, or compost of any kind, or of taking out manure, as well as also for ventilation during the heat of the summer months. I need not say that the eaves of all the buildings should be provided with gutters sufficient to carry off all the water falling upon the roofs, when no portion of it may, for any purpose, be wanted.

Having given my own arrangement and experience in this matter at the meeting of the Club last week, I will only add, that in case the farmer is desirous to adopt the "soiling system," as it is usually termed, that is, by keeping his cattle yarded during the summer season, cutting and feeding his fodder green, I know of no better arrangement for convenience and for the comfort of his cattle than this spacious shed supplied with the kind of suspended fodder racks—models of which having been already exhibited and explained—both as a protection of cattle stock from the midday sun, &c., as well as a perfect security from all loss or waste of manure.

George Waring, Jr., said—Mr. Chairman, should any one attempt to apologise for the existence of weeds, he would not be without arguments to sustain his position. Even mosquitoes have been found of use in keeping us from complete idleness in the months of languor. Weeds shade tender plants from the too ardent rays of the sun, and in a measure serve as a mulch to the ground. Some weeds by their offensive odor drive away many insects. They may serve as a green crop to be placed in the soil and increase its organic matter. They make us stir the soil, and thus increase its fertility. Still, Mr. Chairman, while thinking out these uses of weeds, we find more urgent reasons why they should not be allowed to grow.

They occupy the soil to the disadvantage of cultivated crops.

They exclude light and heat from the young plant, and thus interfere with its growth.

They take up mineral and other matters from the soil and hold them during the growing season, thus depriving the crops of their use.

Even as a green crop, they prepare the soil for the use of future weeds more than for the use of crops, because they contain and deposit in the soil exactly the kind of food required by the same species of plants.

It is not necessary to argue the injury done by weeds. Every farmer is convinced that they should be destroyed, and the means of accomplishing this are of the utmost importance.

In the first place, we must protect ourselves against their increase. This may be done by decomposing all manures in compost, whereby the seeds contained will be killed by the heat of fermentation; or if each cord of manure has mixed with it one bushel of common salt, the seeds, as well as insects, will be destroyed; by hoeing, or otherwise destroying growing weeds before they mature their seeds, and by keeping the soil in the best chemical condition, for reasons which have been before described by Prof. Mapes.

The removal of weeds from the soil by the use of the hoe, cultivator, and horse-hoe, and by the application of six bushels of salt per acre for the more tender kinds, has been sufficiently discussed at previous meetings.

The subject of the excrementitious matter of plants cannot be too closely investigated by farmers and scientific men. If we can so systematize it as to know exactly what plants will destroy others, by this means we shall have in our hands a most highly valuable accessory to practical farming.

Solon Robinson—It is a very difficult thing to determine what are weeds and what are not. Webster defines a weed to be "Any plant that is useless or troublesome." The word, therefore, has no definite application to any plant or species of plants; but whatever plants grow among corn, grass, or in hedges, and which are

either of no use to man or injurious to crops, are denominated weeds." So is the cotton plant. It is the common appellation at the South. Planters speak of the rapid or slow growth of the weed as commonly as we do of pig-weed. But the most noxious weeds we have to contend with is grass. In Louisiana and Mississippi a species known as coco grass is a great trouble to cotton planters, and has driven a great many of them from their plantations. The grass has a tough, black root, strung with nuts like black beans. The least fibre of one of these roots will grow, and although the plant is as tender as a hot-house tomato, as regards frost, its vitality is almost indestructible by heat The levees in Missippi along the sugar plantations are covered with coco grass. The sweet kind is very good for hogs, and they root to a great depth after the roots but cannot reach the bottom of them, as I have seen where they were down seven feet. Another very noxious weed to the cotton planter is called Bermuda grass. This is a creeper; it runs great lengths, sending down roots from every joint, and is very difficult to eradicate from the land when it once gets possession. I have seen hands working with iron tooth rakes after the land was plowed, to take it out of the soil before planting. On the eastern shore of Virginia there grows upon all the cultivated lands a leguminous plant, a sort of pigeon pea, called the maggotty May bean, which we should probably call a noxious weed. There it is looked upon as a valuable fertilizer. Through all the planting States grass is looked upon as the most noxious weed they are pestered with. They kill grass and buy hay. We sell it to them. Grass is not noxious to Northern farmers.

Prof. Mapes—Salt is one of the best applications to soil to exterminate weeds. Sow salt enough on asparagus beds in the spring to whiten the earth—it will eradicate all noxious weeds. You may salt land so much as to render it barren, but that will be only one year, and that will improve the soil. You may restore over salted land by caustic lime. This will make soda and chlorine, which are valuable fertilizers. Salt never should be dissolved before applying it. Sow it and leave it on the surface. It will kill grubs, and may be used to advantage on potato land. Potatoes have been grown in Jersey sands with raw salt muck for

manure, to better advantage than by any other fertilizer. This also serves as a good fertilizer for the next crop. An Irishman in the Newark meadows raised 600 bushels to the acre, year after year, with no other manure than the salt muck. I have lately learned something useful from a French nurseryman in regard to setting out pear trees, grafted upon quince stocks. He said that stocks with pear grafts on quince should be inserted deep enough for the graft to take root. The quince roots should be trimmed off as well as the limbs of the graft.

Mr. Lodge said a farmer from Nova Scotia came here with a vessel load of potatoes, the other day, for which he obtained $5,000. They were grown so near the sea shore, upon sandy land, that the tide and spray affected the land and kept the potatoes healthy. I have often proved the value of salt for manure. I had in tillage, in Europe, 126 acres, which we kept so clean of weeds that you could not get a barrow load of weeds on the whole plot. I do not believe in growing weeds to manure the land.

By the Chairman—Was any manure applied?

Mr. Lodge—No, sir, and the heat of the sun there would kill almost any plant. The whole farm of one hundred and twenty-six acres was spaded—no weeds allowed to grow in it. I have been a gardener forty years. I always stirred up the ground deep, to let in the elements, including the ammonia. You could not have gathered a single wheelbarrow load of weeds on the 126 acres. A pure, dry air prevailed over it.

Prof. Mapes—I have spoken of salt swamp muck used successfully for potatoes; that muck does not contain a pound weight of sand in 100 pounds weight of it—it is almost exclusively vegetable matter.

Mr. Robinson stated the singular method used in the Sandwich Islands to raise potatoes. They put the seed upon naked fields of volcanic lava in some places, cover them with bushes to a certain extent, and thus grow their best yam potatoes.

Annales de la Societe Imperiale d'Horticulture, Paris, 1853.

Remarks of Mons. Bossin *upon the possibility of giving to Pomology new species of stone fruits of late flowering, to escape frost.*

Pomology is, without contradiction, one of the branches of horticulture which have in our day made the most remarkable progress. Most of the labors of pomologists heretofore have been employed in the making fruits of finer flavor, larger size, their successive ripening, and they have had good success in these efforts during the last half century. Colonel Leconteur wrote from the island of Jersey in 1845, "I shall not cease to plant and to labor in propagating good fruits until I have gained fifty-two good ones, ripening one after the other each week of the whole year, so that I can have a change of fruit on my table every Sunday."

Every year we feel the disastrous effects of frost in two-thirds of the departments of France. Some years we are thus deprived of all our prunes, almonds, cherries, peaches and apricots—of the latter much oftener than of the former.

Now, my idea is to attain a remedy. That every year—in all parts of France, Europe, and in the whole civilized world, there should be planted nuts of the first four or five named sorts, namely, prunes, almonds, cherries, peaches and apricots—all, in every place, on the same day, so that we can have trees that will not blossom in France until some fifteen days later than our native trees do, and so totally escape the frost.

The nuts of such trees as are latest in flowering should be planted. It is said that the sage olive of the Spanish Pyrenees is very late in blossoming—is never frost hurt. In some parts of Normandy preference is given to apple trees of tardy bloom.

Much is due to the position of the trees in our gardens. Peach and apricot trees placed in the lower and cooler part of a garden have been known to bloom richly and sooner than those at the top of the inclined garden, but bore poorly, while the latter bloomed from fifteen days to three weeks later, and bore good crops.

Our losses for want of true knowledge and management are enormous. One proprietor in the Commune of Fouzerolles, be-

tween Plombieres and Luxeuil (on the upper Saone), told us recently that before 1847 that Commune (parish) supplied eight hundred thousand litres (about 200,000 gallons, equal to 2,000 hogsheads of *Kirsch wasser*—cherry water) of the first quality, but for the last five or six years the frosts have so destroyed the cherries that many proprietors talk of rooting their trees out.

New conquests can be gained by intelligent practice among pomologists, and we appeal to them, wherever they be, to look into it.

Mr. Robinson remarked that the number of members attending to-day is less than usual, but if our doctrines be good the world will hear of it. Dr. Beecher's sermons are not to his congregation alone, but to the readers of an hundred thousand Tribunes or other papers.

Subject adopted for the next meeting: "Summer Management of Farm Manure."

The Club then adjourned to May 9 (Tuesday), at noon.

H. MEIGS, Secretary.

May 9, 1854.

Present—Messrs. Hooper & Coleman, of Brooklyn, Judge Scoville, Captain Holmes, Judge Van Wyck, Dr. Leavitt, Judge R. S. Livingston, Professor Mapes, John Robinson, Mr. Waring, Mr. Berrian of Illinois, Mr. Whiley, Hon John B. Scott, and others. Judge Scott in the chair. Henry Meigs, Secretary.

The Secretary read the following paper, translated and prepared by him.

A NEW COLONY PROPOSED FOR AUSTRALIA.

[From the Journal of the Society of Arts. Dec., 1853.]

The northern coast of Australia is indented by the great Gulf of Carpentaria, which penetrates the interior for 600 miles; and is 300 miles wide; navigation clear; a fine harbor on its southern shore. Many rivers fall into it. One has been navigated 60 miles

by vessels, and those of 12 feet water for 13 miles. The Gulf was explored by Captain Flinders in 1802. The southern coast rises from the shore to an immense plateau, discovered by Captain Stokes in 1841, and called by him "The Plains of Promise." Dr. Leichardt visited it in 1845. The soil is a light colored mould of great depth. Sir William Hooker has declared it to be of a rich quality. Palms, bamboos, gum and acacias grow along the water courses, and in clumps over the plains. Cotton, tobacco, grain, oil, and other vegetable products of those latitudes may be cultivated with advantage. *The nutmeg grows wild there.* On the western side the country is mountainous, iron, &c., are there. Leichardt dwells much on the value of the country for grazing—that his own beasts, on his journeys there, were kept in capital condition. Sheep have already reached the neighborhood of the Peak Range, within 500 miles of the Gulf. Elevated ranges rise at no great distance from the coast, both to the eastward and westward. The temperature was instrumentally observed both by Captains Flinders and Stokes. The former between November 4th and March 6th, the hottest months. The thermometer on shipboard ranged from 81° to 87°. He says it may have been 5° or 10° higher on land. He ascended the river Albert, and discovered the "Plains of Promise" in July and August, and found the thermometer at 51°, and usually below 62°, until 7 o'clock A. M., and below it after 6 o'clock P. M. Dr. Leichardt observed this also in 1845. He states the bracing effect of the air—"We were all well." The climate is congenial to health; for without comforts, without flour or salt, and miserably clothed—we were all in health.

[From the same.]

ON THE NEW ZELAND FLAX—*Formium Tenax.*

Experiments show that it has a peculiar quality, besides its great strength, that of hackling out to an almost inconceivable fineness. A comparative analysis of it and Irish flax has been made at the laboratory, Chemico Agricultural Society, at Belfast, in November, 1853. One hunnred parts of each contain—

	New Zeland.	Irish.
Water,	60.39	56.64
Organic matters,	37.88	41.97
Ash,	1.73	1.39
	100.00	100.00
Ash per cent in plants dried at 212° Fahrenheit,	4.36	3.20

One hundred parts of the dried leaves of the New Zealand flax gave 1.64 of nitrogen, while same amount of the Irish gave 0.53 of nitrogen. The ashes of the New Zeland and Irish flax contain respectively—

	New Zeland Flax.	Irish.
Potash,	14.93	20.32
Soda,	5.38	2.07
Chloride of sodium,	8.75	9.27
Lime,	28.53	19.88
Magnesia,	1.41	4.05
Oxide of iron,	1.21	2.83
Sulphuric acid,	4.64	7.13
Phosphoric acid,	18.96	10.24
Carbonic acid,	13.16	10.72
Silica,	3.12	12.80
	100.78	99.31

(Signed,) JOHN F. HODGES, M. D.,
Chemist to the Society.

I deprecate the use of *much alkali* to soften the plant, or the use of fire heat in drying it, having found that both *add greatly* to the brittleness of the fibre in the green state.

[From the same.]

MUDDAR.

In the August number of the Journal is an important communication from Dr. Riddell, of the Nizams service. On the *elastic gum* obtained from the sap of the muddar, which he conceives might be employed as a substitute for gutta percha, experiment

proves its unfitness for coating telegraph wires; it is a conductor of electricity instead of a non conductor, like the former. But it has a singular utility. The catgut used for turning lathes is attacked by rats, and the whip cords substituted stretched or shrank alternately. We soaked them in Mudder milk; no animal meddles with these. It is used to render cloth and leather waterproof, and bow strings elastic. Mudder is, by botanists, called Calotropis gigantea. (Lindley says it is called Akund, Tercum, or Mudar.)

LEAVES OF THE COFFEE TREE—EXCELLENT SUBSTITUTE FOR TEA.

Dr. Gardner, of London, exhibited at the Crystal Palace, in London, in 1851, prepared coffee leaves, and the essence or *caffeine* extracted from them. Ceylon papers since ask for supplies of tons of coffee leaves. On western side of Sumatra, roasted coffee leaves are used in infusion to such an extent as to be regarded as one of the few necessaries of life. N. M. Ward, Esq., of Padang, says, May 15, 1853:—Although long aware of the value of it as an article of diet among the natives, it strikes me that its adoption in Europe would be attended with important advantages to the laboring classes. The natives here universally use it, preferring it to pure water, which they assert does not quench thirst or give strength as coffee leaves do. With a little boiled rice, and an infusion of the coffee leaves, he supports the severe labor of rice planting, up to the knees in mud, under an alternate burning sun and drenching rains, which *liquor* or *water* will not enable him to do. For twenty years I have observed the comparative effects of the coffee leaf tea in one class of natives, and of spirituous liquors in another. The native Sumatrans use the first, and the natives of British India the spirits. I find that the former expose themselves with impunity for any period to every degree of heat, cold and wet, while those who use spirituous liquors cannot endure wet or cold without danger to their health. Engaged myself in agriculture, and being, consequently, much exposed to the weather, I was induced, several year ago, from an occasional use of the coffee leaf tea, to adopt it as a daily beverage, and my constant practice has been to take a couple of cups of strong in-

fusion with milk in the evening as a restorative after the business of the day. I find from it immediate relief from hunger and fatigue, my bodily strength increased, and my mind left clear and in full possession of all its faculties for the evening. On its first use, and when the leaf has not been properly roasted, it is said to produce vigilance (wakefulness), but I am inclined to think that this is not the case, but that it merely adds strength and activity to the mental faculties rather than a nervous excitement. I do not recollect the effect on myself but once, and then the leaves were not properly roasted. The natives universally prefer the leaf to the berry, giving, as a reason, that it contains more bitter than the berry, and is more nutritious. In the lowlands the coffee tree is not planted for the berry, not being sufficiently productive, but about their houses for the leaves only. They every where prefer the leaf to the berry, and only when leaves are scarce do they mix berries with them. They roast the leaves over a clear fire of bamboo that there may be no kreosote or smoke on the leaves. (Our coffee roasters would do them brown better still.—H. Meigs.) The price of prepared leaves here is $1\frac{1}{2}$ pennies a pound=3 cents. The sample sent by Mr. Ward arrived in London in excellent condition. It appeares to have been carefully prepared; consists of tolerably regular fragments of leaves mixed with pieces of stalks, color deep brown, odor like mixed tea and coffee, *extremely fragrant.*

CLIMATE OF MADRID, SPAIN.

[Annales de la Societe Imperiale D'Horticulture de Paris, 1854.]

Summary of Meteorological Observations made at Madrid in 1852. *By Mr. Vie, Gardener of Her Majesty the Queen of Spain.*

1852.

January.—19° Centigrade=to nearly 65° Fahrenheit, greatest heat of the month. Greatest cold, 6° Centi.=about 41° Fah. Clear, 14 days; cloudy, 13; sky covered, 8; rain, 1; fog, 5. Wind prevailing from N. W.

February.—Greatest heat, 76° Fah.; least heat, 47°. Clear, 14 days; cloudy, 13; rainy, 2. Prevailing winds north.

March.—Greatest heat, 76° Fah.; least heat, 41. Clear, 8 days; cloudy, 12; covered sky, 5; rain, 5; snow, 1. Prevailing wind S. W.

April.—Greatest heat, 82°; least, 33°. Clear, 3 days; cloudy, 20; covered sky, 5; rain, 2. Wind from south.

May.—Greatest heat, 93°; least, 33°. Clear, 8 days; cloudy, 18; covered sky, 2; rain, 1; stormy, 2. Wind S. W.

June.—Greatest heat, 103°; least, 46°. Clear, 8 days; cloudy, 18; covered sky, 1; rain, 2. Wind N. W.

July.—Greatest heat, 113°; least, 47°. Clear, 19 days; cloudy, 11, storm, 1. Wind S. W.

August.—Greatest heat, 108°; least, 45°. Clear, 18 days; cloudy, 9; rain, 4. Wind N. and N. W.

September.—Greatest heat, 101°; least, 41°. Clear, 2 days; cloudy, 25; rain, 2; storm, 1. Wind N. W.

October.—Greatest heat, 77°; least, 33°, on the 12th of the month. Clear, 3 days; cloudy, 21; rain, 5; fog, 2, Wind S.W. and N.W.

November.—Greatest heat, 77°; least, 30°, on the 6th of the month. Clear, 7 days; cloudy, 14; covered sky, 3; rain, 5; fog, 1. Wind, S. W.

December.—Greatest heat, 67°; least, 26°, on the 1st of the month. Clear, 12 days; cloudy, 6; covered sky, 5; rain, 2; fog, 2. Wind N. W.

MANURES—PROPER DEPTHS FOR BURYING THEM.

Prof. Mapes—No subject connected with agriculture is more misunderstood than the above, and simply because part and not all the laws connected with the retaining powers of the soil and of the actions of the roots of crops are taken into account.

First, then, as to farm-yard and all other analogous manures, and their actions, the following facts should be borne in mind:

All fertile soils contain carbon, alumina, sand, and the various inorganic requirements of plants, and these latter (inorganic requirements) are in part freed from their prison houses (the internal portions of particles) by the chemical actions consequent upon the decay of decomposable manures.

Putrescent manures, those of vegetable and animal origin, as they decompose, assume the gaseous (air like) form, and as gases, are either absorbed by the soil or rise and escape from it into the atmosphere That these decomposable substances do not descend into the soil to any material distance, either when in solution in water or in the gaseous form, is proved by the following facts, well known to all observing farmers:

If an old barn-yard be dug to a depth of three inches below where the earth has ever been disturbed, the soil will be found to contain no portion of the decomposed matters carried down in solution.

If the brown liquor of a barn-yard be poured on top of a barrel of earth, and suffered to filter downward through the mass, the color, odor, and all other matters of a putrescent kind, will be abstracted from the solution by the soil, and water colorless and inodorous, will run from the bottom of the barrel. If the soil had not this property, water from wells could not be drunk, as the soluble portions, consequent upon the decay of vegetation, would all pass down into the wells, and render the water useless as a beverage.

Now, what is it in the soil that exerts this curious influence? Simply the carbon and alumina which it contains, as is proved by the following experiment:

Fill three barrels with pure sand, entirely free from all other substances. Leave one of these barrels of sand in its natural state; to another add five per cent. of finely divided carbon (charcoal), evenly mixed throughout it; and to the third, five per cent of alumina (common clay). Bore small holes in the bottoms of these barrels, and then pour the brown liquor from the barn yard on top

all the barrels; the brown liquor will pass through the barrel of pure sand unaltered, its color will remain dark, and its odor offensive; but that which runs through the barrels containing charcoal or clay will have lost both color and smell, clearly showing that to these ingredients the soil owes its property of retaining the requirements of plants from solutions. It is true that some other ingredients in the soil have similar powers, but to a very limited extent, as compared with carbon and alumina.

The next question which naturally arises is: will these constituents detain gases as readily as materials in solution? The answer is, yes; and the proofs equally simple. A wire sieve suspended in the upper part of the well-hole of a privy, and of its full size, and filled with charcoal, will receive and retain all the gases as they rise, so as to render the privy inodorous. A coating of charcoal on a compost heap, if sufficient in quantity, will receive and retain all the escaping gases, and alumina will do the same if divided with some other material, so as to present a sufficient amount of clay surface to receive the gases. Night soil, when mixed with charcoal or clay, is rendered entirely inodorous, and indeed, when mixed with decomposed muck, which contains carbon, the same effect is produced. The refuse liquor of gas houses, when thoroughly stirred in a magma or semi-solution with clay, loses its odor, and is thus the best manure, and in the best form to apply to poor, sterile, sandy soils. Carbon (charcoal), when mixed with this fluid waste, in the same way, produces a similar result; and even woods-earth, or headlands, from the amount of carbon they contain, are good deodorizers.

If a quantity of charcoal dust heated red hot, and then suffered to cool in a close vessel, be afterwards divided into two parcels, the following experiment may be made, which will clearly establish the fact that carbon is capable of absorbing gases:

Exclude one half the carbon from the atmosphere; place the other half in a sieve, and suspend it over a fermenting manure heap for a few hours, then apply these two portions of the charcoal to separate pieces of land, of the same quality, and containing the same crop. The result will be that the charcoal charged

with the gases of the compost heap will cause much greater growths to occur than will be observed from the other portion not so treated. The same results will occur with alumina (clay), when mixed with a permeable divisor, and placed where the fertilizing gases can pass through the mass.

From the foregoing it is then evident that when manures decompose in a soil fairly charged with carbonaceous matter and alumina, that portions in solution do not filter downward to any material depth; and after assuming the gaseous form, that these gases cannot pass upward through such soils into the atmosphere, but are retained for the use of plants, if the manures from which these gases arise are at sufficient depth for the rising gases to meet with a sufficient number of particles of the absorbing materials before their reaching the surface.

The proper depth, then, to which manures should be buried in the soil, must depend in part on the quality of that soil. If the surface soil be thin and underlaid by a pure sand or gravel as a subsoil, then, of course, the manure should not be so deeply buried as to lose its soluble portions in this sand or gravel, but should rather be underlaid by a few inches of soil, so as to absorb the soluble portions of the manure.

In a sandy surface soil, having but slight quantities of carbon or clay, manures, as a general rule, should be more deeply buried, so that the resultant gases may be all absorbed before their escape at the surface; while in black (carbonaceous) or clayey loams a less depth will secure the desired results.

There are many other facts, however, which the judicious cultivator of the soil must take into account before deciding on the depth to which he will plant his manures. Thus the market gardener, who averages three crops in the season from the same soil, must place part, at least, of his manure near enough the surface to decompose rapidly from the assistance of the sun's heat, atmospheric influence, &c., which will take place at much greater depth in well under-drained and subsoiled land; while the farmer who wishes to lay down his land to grass, and would prefer that

the action of his manures should be slower, will, of course, bury them more deeply, so that their less rapid decomposition will ensure a longer continuance of his meadow. Indeed, for perennials, the depth for burying the greater portion of barn-yard manures should be increased as compared with annuals, and even with the latter, the depth of the roots should be taken into account; part of the roots, at least, should be fed at such depths as will secure them from the effects of drought.

The above remarks are applicable to barn-yard manure, night-soil, factory wastes of a putrescent kind, and all other readily decomposable materials, but apply with much less force to other kinds of manures.

Manures which are used as top-dressings, stimulants, &c, and which contain volatile portions, should be so prepared before use as to contain within themselves the means of retaining their own gases as rapidly as liberated. Thus a field dressed with a solution of carbonate of ammonia would show immediate improvement, but the effect of the manure would not last out the growing season of the crop. If, however, the carbonate of ammonia be first changed to a sulphate of ammonia, which is not volatile but equally valuable as a manure, then it may be applied as a top-dressing without loss, and it will last until all used by crops. Now, this manure, in common with many others, is not volatile, but is soluble; but as solutions which are not volatile do not rise in the soil, but continue to descend to the depth to which the soil has been disintegrated, and are rendered doubly valuable by intimate admixture with the soil, they should be applied in the most divided form, at or near the surface. Thus Peruvian guano, which contains both volatile and soluble materials, should be first properly prepared to prevent loss by evaporation, and then applied at or near the surface, so that in its descent while in solution it may come in contact with every particle of the soil and with every root. The improved super-phosphate of lime, and many other manures, are not volatile, but slowly soluble, and thus may be applied without additions other than well chosen divisors to ensure their equal distribution.

We have before given full directions for the mode of preparing guano by admixture with charcoal dust, or black soil moistened with dilute sulphuric acid a few days before use. So prepared, guano will not desert corn before the completion of the ears, nor will it all evaporate from the soil during the growth of a single crop. These directions should not be confused with deepening of soils by the burying of coarse manures, &c., so as to assist in the admission of atmosphere and the consequent freeing of the inorganic constituents of the soil, which, without such assistance, may remain pent up in the particles without ever coming in contact with the roots of plants, nor with the use of lime, potash, and other alkalies, when used for the purpose of forming the soluble silicates, and not as food for plants in their natural state. Such amendments should always be placed near the surface by simple harrowing, and they will gradually descend as dissolved.

Dr. O. S. Leavitt exhibited various samples of unrotted flax in various stages of preparation, from the flax straw to fine linen yarn. He remarked that heretofore there had been numerous difficulties in the way of manufacturing linen from unrotted flax, and which difficulties had now been entirely overcome by his inventions. Heretofore it has been considered impossible to break flax in its unrotted condition so as to make it pay, on account of the great imperfection of the machinery that has been used. It would either do too little work, injure the fibre, or make too much waste. Many of the machines heretofore used have been found to break more owners than flax. He exhibited flax as it came from his machine, which breaks two tons of flax straw a day without injury to the fibre, and without making any waste whatever. The machine delivers the flax in a sliver, endless, continuous, being fed into the machine by lapping one handful of flax straw upon another in the feed table. It has thus, in the most convenient form possible, to pass through subsequent machinery for dividing the fibres and divesting the flax more completely of shives. This flax, when broken and cleaned, the flax straw being $10 per ton, is laid down at less than 3 cents per lb. Ten tons of straw make about one of fibre in its crude condition, containing the gluten, so that the manufacturer has to pay the

farmer 2 cents per lb., and the breaking and cleaning cost a little less than 1 cent. This flax at 3 cents can be made into fair rope for less than two cents more, and he showed a sample of such rope which can be made for less than 5 cents per lb., now worth in the market from 10 to 15 cents. Some rope has been made from this kind of flax of exceeding beauty. He also exhibited samples from unrotted hemp, which he manufactured in Kentucky at an establishment which he set in operation, and which is now working successfully, which has been, by a cheap process, so kyanized as not to decay when exposed to the weather. One sample had been so exposed for one year, and which, by examination, showed the fibre uninjured by decay. He showed, also, samples of excellent twine made from unrotted flax, which he said could be manufactured for 10 cents, and worth 25 and 30 cents per lb. Flax fibre costs less than hemp, as the seed alone pays the farmer well where the straw is thrown away, as is often done at the West. In producing hemp fibre no seed is saved. Dr. L. then called the attention of the club to samples of flax and hemp having the gluten and other extraneous matter removed by a new process—chemical and mechanical means combined. He stated that refining and bleaching flax before spinning was not a new idea—that it had often been attempted before but without success, on account of various obstacles which he had been able to overcome. It had been tried in England and on the continent of Europe many years ago. There was no difficulty in purifying the fibre of flax or hemp before spinning by a half dozen processes. But the usual modes have been too expensive, and when dried, the fibres have been so matted together that, in attempting to heckle out for working in the usual way nearly all goes to tow. By any mode of purifying and refining flax fibre before spinning, the fibre will be so finely divided that all attempts to heckle flax the full length will fail. And any attempt to work the flax as short line, if heckled on the usual plan, either by hand or by machinery, will fail. He stated that he had adopted a very cheap and efficacious mode of refining flax, using very simple and cheap chemicals and machinery—that he had a method of drying so that the fibres were not matted together; and by a newly-invented machine, all the trash and fibres, less than two inches long, were

taken out to be used as tow or flax cotton, and all the rest retained and delivered in a sliver form ready for the drawing frames—that all this could be done at a trifling expense, less than two cents per pound, making less tow than by the old mode, and saving nearly all the enormous expense heretofore deemed indispensable for heckling. It was stated that in spinning fine yarns it is customary to cut the ordinary hands or heads of flax into three or four parts, six or eight inches long, and that more even yarn is made in this way and with less loss of tow in heckling as much as they are compelled to heckle the ordinary rotted flax for fine spinning. A fact, he said, was not generally known, which he stated, and which was, that in all fine linens, all but the very coarser kinds, the fibres of flax are parted in the operation of spinning, the instant before being twisted, to about 2½ inches in length—that this could be seen by any one who would untwist a thread of linen, and try the length of fibres. It was said that the flax roving passed through warm water in a trough on the spinning frame, and the flax being softened by the maceration, the fibres are parted by the action of the rollers, the front pair running some sixteen times faster than the rear pair of holding rollers, placed from two to three inches back of the front ones. This will show that every fibre from two to three inches long should be saved, if possible, for linen, and the great value of his machine and process by which nothing goes to tow but the very shortest fibres, making the tow all short enough to card with wool as flax cotton. In this way flax cotton could be produced much cheaper than in any other, using only the inferior portion of the material for this purpose. He had made flax cotton many years ago, but could never see much object in it; it seemed like an absurdity to make poor cotton out of good flax. The greatest value of flax cotton, except for linen fillings, is to combine with wool in place of cotton. He showed a sample of tweeds, the filling of which was two-thirds flax. It gives the goods much greater strength and durability than cotton with wool, or even all wool. The goods could not be torn by a man lengthwise. It is customary to make tweeds and all woollen-mixed goods now mostly of cotton, and the opinion seems to be rapidly gaining ground among woollen manufacturers that sheep are useful only

for mutton. He had seen them mix 20 pounds of wool with 100 pounds of cotton, and some were now putting cotton machinery in their woollen factories for spinning all cotton yarns, putting in here and there a thread having a little wool in combination just for a blind. If either is to be combined with wool, flax cotton is far preferable. The amount of cotton now used for this purpose in this country exceeds 20,000 bales. He exhibited besides a sliver of refined bleached flax, soft, and fine as silk, some roving and linen yarn from the same, which were greatly admired. The roving was prepared in a different manner from what is usual, said to be more expeditious and less expensive.

Some of the greatest advantages resulting from this new American mode of making linen were, that all the flax will run to fine numbers alike, while, by the use of rotted flax, only here and there a lot of flax can be spun fine—that all the flax, coarse or fine, and even hemp (a sample of which was exhibited), by this mode of preparation, come alike fine, while, by the modes of manufacture heretofore used, the straw must be very fine, made by thick sowing, in order to be spun to fine numbers—that the goods made from flax prepared in this way will bleach as easily as cotton goods, not having 30 per cent of glutenous extraneous matter twisted up with the fibre that cannot be removed without injury to the fibre itself—that the linens made in this way must be superior in durability to those made from flax prepared by rotting, and which is generally injured in strength by the process, being rotten as well as rotted.

Dr. L. stated, that at Marcellus, N. Y., some very careful experiments had been made as to the quantity of fibre contained in a ton of straw—that flax, undivested of gluten, worked in the crude state without netting or refining, such as is used for rope or twine, the proportion to the weight of straw is as one to four—that this loses in refining, necessary to produce linen, over one half, requiring nine to ten tons of unrotted flax straw to produce one ton of linen material, divested of everything but pure fibre, or one ton of linen goods.

By this mode of manufacture, linens could be made for about the cost of cotton goods of the same weight and fineness, at the

average prices of cotton. With straw at $10 per ton, the amount paid the farmer is 5 cents per lb. for fibre, and the cost of breaking and refining enough for a pound, will be less than 5 cents more, making the refined material, like that exhibited, less than 10 cents per lb., about the average price of cotton. If the flax that is cut with a scythe like hay, such as can be bought at the West for about $5 per ton, be used, of course the fibre would cost less. At any rate very large profits must be made at the linen business for many years, until competition shall eventually bring down prices. Shirt linen will average 4½ yards to the pound, so that the raw material will cost less than 1½ cents per yard, all the rest being labor in the factory. There is no doubt that such goods can be produced for 10 to 12 cents per yard. From a calculation that had been made, one twenty fifth of the cultivated land in the northern States being in flax, would produce an amount of linen fibre equal to one-half of our present average cotton crop, and there is no reason why one-twelfth, or even one-sixth of the cultivated land should not be in flax if desired. It was remarked that no figures could be made from any true data that would show a less profit than 100 per cent by the new mode of manufacture, either of linen, cordage, or coarse bagging fabrics.

Mr. Coleman, of Brooklyn, asked Professor Mapes as to the escape of the ammonia.

Professor Mapes referred to the example so often mentioned by him of a barrel of soil into which manures, with their ammonia, are put, all of which are found to be absorbed by the soil, and nothing escapes at the bottom but clear water. The strong smells of guano and other matters are lost in the soil. The Professor spoke of the use of green crops ploughed in—clover for example—as being due to the fact that the constituent fertilizers were contained in a perfectly divided state in the green plant, and when mixed with soil were perfectly ready for the use of other plants. It is on the same principle that the fluid manures act so beneficially for plants.

Mr Meigs—In reference to the now well-known facts that the stimulants and pabulum for plants do not descend, but ascend,

forming such enormous columns of vegetable matter as the great Seynoia of California, 30 feet high and 90 round, carried up by those forces of vegetation to that enormous height directly against the power of gravitation, a weight of 500 *or* 600 *tons!* Mr. M. had noticed the condition of the sand under a privy, at least 100 years old, in Beekman street, last year. At his request the master builder made a laborer take, with a shovel, some of the sand about six inches below the bottom of this ancient black deposit of manure of the strongest kind, human ordure. The sand so taken was as pure and as perfectly free from color and smell as any pure sand whatever. And why so? What would become of us if all our organic matter should leach down below the reach of vegetation? Sir, Dr. Underhill told us, several years ago, that the leaching *was not down but upwards.*

Mr. Robinson requested Dr. Leavitt, of Marcellus, in this State, to explain, with the products before him on the table, the condition of the great process pursued by him of making out of flax unrotted the strong and beautiful silk-like fibre, yet stronger than the rotted flax of Holland here shown, the latter being, in our market, worth about thirty cents per pound, while the Leavitt flax is made at about 10 to 12 cents per pound.

Subject for the next meeting adopted on motion of Professor Mapes, "Summer treatment of grape vines and small fruits."

Professor Mapes suggested—What can be done with millet planted and grown as hay?

Dr. Leavitt—The question is asked, Why is flax cheaper than hemp? Answer—Because the flax seed pays for the crop.

The Club adjourned till the regular meeting on Tuesday, May 16, at noon. H. MEIGS, *Secretary.*

May 16, 1854.

Present—Messrs. Prof. Mapes, Waring, Robinson, Edward Smith, George Bacon, Col. Travers, Mr. Gibbs, Mr. Bullock, Capt.

Holmes, Dr. Leavitt, of Marcellus, Chester Coleman, of Brooklyn, Mr. Van Boskerck, Captain Pell, and others—nearly forty in all.

Solon Robinson was called to the chair.

Henry Meigs, Secretary.

The Secretary read the following papers, translated and selected by him, viz:

[Revue Horticole, February 15, 1854.]

ASSYRIAN HORTICULTURE.

Layard has done good service by his explorations at Nineveh. Quintus Curtius rejected the story of the hanging gardens at Babylon, and so have other great historians, as so many fables. He has found at Babylon a table of stone bearing a good representation, well preserved, of those famous gardens, established upon platforms supported by columns, the style of which very much resembles the Corinthian order. He has introduced into England many kinds of oak trees from Kurdistan, especially the Quercus Brantii, so named from the discoverer, Brant. It is the sacred tree mentioned in the Bible, under which the King, Senacherib, sacrificed to his false gods. This truth is shown by a transparent cylinder (doubtless an agate) found in the ruins of the palace; it bears an engraved figure precisely of the acorn of the sacred tree. This oak is one of the most beautiful of the oak trees.

The plains of Chaldea have been visited by very few botanists, so that they may be termed virgin to horticulturists. From thence originally came to Europe some of our best fruit trees, and lately an Englishman has brought into Europe, from there, the delicious Stanwick peach, the best of all, and which the horticulturists of Great Britain pay (we may say) its weight in gold for. Layard always speaks with enthusiasm of the vegetable riches of those vast plains, in spring covered with flowers, one after another, daily changing color through the whole scale of colors; this continues until stopped by the summer heat. In the mountains of Kurdistan—their heads are snowy in summer—are found truffles in abundance, and an extensive trade in them is carried on. Dates form the basis of

the people's food. We take a great interest in the character of the tree out of which the timber used in the edifices of Nineveh was made.

[Annales de la Societe Imperiale d'Horticulture, Paris, 1854.]

Minutes of the sitting on 15th of December last:

Mr. Flantin placed upon the table three bunches of magnificent Chasselon grapes, of very high color, raised by him in his garden.

Questioned—Did you preserve from the Oidium by using sulphur? Yes, when he had perceived that they were attacked, and he had observed the disease this morning. He had preserved these grapes by stretching a cloth over them.

[Revue Rorticole, Paris, February, 1854.]

AZALEAS.

Under this name are confounded four different types.

1. Azalea procumbens—a small Alpine plant, which de Candolle has called by the generic name *Loiseleuria*.

2. A sort of rhododendron—a sub-genus to which we apply the name of azalea—a shrub.

3. The so-called azalea of India—a mere sub-genus of the rhododendron. We propose to give it the name of tsutsia, by contracting the Indian name, tsu-tsutsi, taken by Kempfer and de Candolle and Don from the Japanese name.

4. The azalea ovata and myrtifolia—a third sub-genus of the rhododendron.

In the rich multiplicity of forms presented by great collections of the azaleas, it is at first difficult to seize the well marked specific types; it requires much study and reflection to know them well—to find out whether they are natural, or much modified by ages of culture in Chinese and Japanese gardens, from whence ours are derived. We know that the same kind of azalea brought from Japan, nearly one hundred years ago, are identically the same as those recently introduced; and further, they are exactly the same as those we find in the herbariums of R. Breynius, Kempfer and Thurnberg. All the species (except one from Java)

come from China or Japan—that in Java is not there natural. The first one of the group known in Europe came to Holland from Batavia in 1680. It was cultivated and admired for about a dozen years, in the garden of Mr. Jerome Van Beverning, a great amateur of holticulture. Since then—strange destiny—it was lost to our gardens until 1768, when some of them were imported from Batavia by the illustrious voyager Commerson.

SUMMER TREATMENT OF GRAPE VINES AND SMALL FRUITS.

By Henry Meigs.

This includes all that we can do for their advantage after they have all formed their leaves and flowers.

The first difficulty I have found is their enemy insects, and the necessity of using all means to destroy them before they destroy the fruit. The growth of these little marauders is surprisingly rapid. We have not ceased to wonder whence they come. On the linden leaf, on Saturday last, we first saw the measurer. It is about one-eighth of an inch long, and yet having all the movements of the large one. The severity of the late spring has apparently had no power to stop the development of this little creature, who finds the lovely dense foliage of our lindens its precious morsel, and within a month the millions of leaves will be destroyed, there being little short of one measurer to every leaf.

We war with these, and curculios, and caterpillars, from genetion to generation, and still find them wiser than ourselves in their time and generations. We have not yet applied our intellect to conquer their instincts. The most intense application of time and magnifying powers will ultimately teach us their habits, locations, &c., and until then we throw away our time and labor, as the fisherman who sought for whales in a rivulet.

Those insects which weave make themselves conspicuous. In the morning early we can easily distinguish their silk—the produce of last night's spinning and weaving—and the family all within the camp like an army in foul weather. When we see this on our trees and plants, we should, being prepared before

hand, make a thorough onset– leave not a web to shelter a stray one. Some have long poles, which they insert into the web, twist it round and round, until the whole are wound on the pole —tread them on the earth, &c. Some use a bunch of cloth or tow, dipped in spirits of turpentine, and burn them. I tried a gun, with small charges of powder only, directed at the web at such a distance from it that the explosion may diverge enough to embrace the whole nest. I have tried it often; it destroyed the nest so that I could never find any vestiges of it or the inhabitants, and yet did not hurt the trees in the slightest degree. Whatever may be the plan of attack upon these terrible little creatures, who, out of our three or four thousand millions of dollars worth of crops in one year in our great country—(the little enemy)— does harm to the extent (very generally) of at least one hundred millions of dollars—a thirtieth part, or nearly the share of a million of our people—more damage than all the navies and armies of Europe could do us in the same campaign—that is between April and November. In wheat, in grapes, in potatoes, the damage to France alone has been more than enough to pay for Napoleon's great onslaught upon Moscow!

When the insect is subdued and the weeds all hoed out, then comes the suitable after tillage of the vine and fruit trees. Sometimes, in an unusual drought, they may want watering. If so, do it in the night. One of the most successful gardeners I have known was Richard Amos, of Greenwich, who in times of hard drought always went to bed soon after breakfast, rose at tea time, and worked all night in the garden with his watering pot. On one occasion he could not get fresh water enough, and resorted to the Hudson river, being on one side of his farm, and used salt water, especially with a very fine hybrid Savoy cabbage field —pouring the salt water around them and near, but not touching the cabbages, for he supposed it would injure their growth, being quite salt at that time of drought. This course of summer treatment of cabbages gave him a great crop when most gardeners and farmers had scarcely any at all. He made three times more money than in ordinary years. Mr. Amos acquired a large fortune for a gardener, probably more than $100,000.

We observe to-day, on the leaves of the linden trees, just leaved out (generally on each leaf), a single measurer of about one tenth of an inch long, quite active. How wonderful a provision for them, after such an inhospitable spring! How shall we prevent this? That most beautiful tree is never permitted to pass one summer in peace.

One rule with regard to our methods of getting rid of the insects is the same applied to all evil, moral and physical, "*Obsta principiis*"—"Oppose it in the beginning." We must scotch it in the egg. Let all who think upon this momentous question seek the remedy.

THE GREAT TREE OF CALIFORNIA.

The great tree of California has attracted the attention of the American Journal of Science and Art.

Andrew Williams, of San Francisco, sent to the American nearly three years ago the leaves and wood of it. We have on the table a piece of the wood, including both sap and heart; the heart resembles red cedar in color, and the sap is like pine. We find the concentric rings in both sap and heart to be about an average of 40 per inch, or 4 to 1-10th of an inch.

If the same ratio extends to the centre of the tree then in the semi-diameter of the large tree, at 30 the whole, we have 15 feet, in which are 1800 concentric circles, showing that to be the age of the tree proximately.

In the Journal, the conclusion attained is an age of 2,066 years.

In the specimens on the table the layers are almost precisely the same in both sap and heart—80 layers in 2 inches.

[Dr. Hooker's Flora of New Zealand. From the same Journal.]

HYBRIDIZATION AND CLIMATE OF PLANTS.

For seventy years past, at the garden at Kew, England, upwards of twenty thousand plants grow in open air, plants from all quarters of the globe, and this within a space which, if left to nature, would not have contained 200 indigenous plants.

Ten thousand experiments on 700 species of plants have produced but 250 true hybrids. Isolation continues for a while some of these hybrids both in plants and animals. What external circumstances can, in the least, account for the origin of the race of Dorking fowls or Manx cats, &c., &c., yet how soon would they disappear if they were left to themselves. Is not this equally true of the human races?

THE LEAVES OF COFFEE BETTER THAN THE BERRIES.

[O Auxiliador Da Industria Nacional Periodico Da Sociedade Auxiliadora, &c. Or, The Auxiliary of National Industry, a periodical by the Auxiliary Society, Rio de Janeiro. Presented to the American Institute by the Consul of Brazil, Senor L. F. H. d'Aguiar.]

DESCOBERTA IMPORTANTE—IMPORTANT DISCOVERY.

Coffee leaf Infusion instead of the Berry.—Chemists have found the essential principles of tea and coffee to be much the same although they still call that from tea *Theine*, and that from coffee *Caffeine*. We wish to enlighten all our readers on this important subject, so very interesting to the commerce of Brazil, which now exports such enormous masses of the coffee berries. Dr. Gardner is of opinion that the quinine is well substituted by the caffeine in the same diseases, it is tonic and antifebrile. What an incalculable value is added to our already vast coffee crop by making the leaves of the tree serve the caffeine much the same as the theine.

GIBBS'S ROTARY DIGGING MACHINE.

Professor Mapes illustrated this new agricultural implement by a working model. The inventor has improved the original, and is now about to add one of the Mapes subsoil ploughs to loosen the ground forward of the teeth, and keep them steady without so much weight. Professor Mapes thinks this machine, judging from experiments with the first rough machine, will do more than three times as much work as a plough, and more than three times as well, with the same team.

The plough requires just as much propelling power to overcome the friction of the land side as it does to turn over the furrow slice, and all that friction is worse than thrown away—it compacts the land and injures it.

There is no power lost in this implement, it is like forking over the soil, and will work three feet wide and fifteen inches deep, with one pair of oxen, rendering the land more pulverulent than a dozen ploughings.

Mr. Mechi said the plough is doomed, in speaking of Samuelson's machine; yet this is much more perfect. In his machine much is lost by friction of gearing; in this there is none; the weight of the machine trips the teeth and throws them out. His machine requires six horses, this two oxen. English farmers pay 40 shillings an acre for spading, and 20 shillings for ploughing, and find their account in the extra cost of the work. The Harsimus gardeners, who raise vegetables for this market, pay $75 an acre rent. They could not pay half of that if they depended upon the plough alone. By the spade they get three or four crops in a season. True, they manure high, but that is not all. Unless you render your land pulverulent you might as well put your manure in the garret to raise potatoes in the cellar. Land that is well forked up will produce more without manure than poorly ploughed land will with it.

Now, if we find that this machine, as I predict it will, can do the work of the man with a fork rapidly and easily, the grand desideratum has been reached, and for much of the work of the farm the plough is doomed, but not as Mr. Mechi thinks for all.

Solon Robinson—I stated the other day how we tried that subsoil plough in a compact hard clay road, and that a yoke of oxen walked right along, tearing up great cakes of earth. If this machine had followed the plough the teeth would have penetrated the disintegrated mass, and rendered the surface of that beaten path fine enough for any ordinary crop. No amount of ploughing would have done as much, and the harrow would only stir the clods about. These statements and explanations were received with marked attention by the gentlemen present.

WASH FOR TREES.

Heat one pound of sal soda to redness in an iron pot, and dissolve it in a gallon of water. This wash will take off all the

moss and dead bark, and kill all the insects on all fruit trees or grape vines, and make them as smooth as though polished, and make old trees bear anew. Never whitewash a tree.

TO PREVENT PEACH WORMS.

In transplanting trees set them an inch higher than they stood before.

Mr. Waring—I was told by Mrs. Thompson, of Burlington, Vt., who is one of the best horticulturists there, that she had succeeded in getting rid of the peach worm by wrapping a black cloth around the hole next to the ground, under which the worms locate, without boring into the wood, and by removing the cloth they are exposed and easily killed.

Professor Mapes.—It is surprising that quinces are not cultivated more. I have known the product of an acre sell for $1,400. They are usually higher than oranges in this market.

Solon Robinson—Dr. Underhill sells his great crop at $3 a hundred for the good ones, and as much more for the poor ones, as he works the latter up into quince syrup. I have seen a tree upon his place with a round bushy head, twenty-five feet in diameter, that bears bushels of great round quinces.

Prof. Mapes—As to the fruit destroyed by birds it is their share, let us raise enough to pay them for their highly important service in killing insects so devastating to many of our crops. Something was said as to pruning. I prune my grape vines in November with advantage; I do more, there is a loose detached bark on the larger canes which I do not suffer to be there, I take it all off and clean the true bark of the vine with the soda mixture, made as follows: Heat a pound of sal soda in a pot red hot, then crush it (when cool) and put it into a gallon of water, which will make (what chemists call) a saturated solution. I use this solution to wash all my trees and vines; it will not wash off in rain. Whitewashing is a miserable plan. Then, as to the grape vines, I pinch off the *third eye* beyond the fruit, and another shoots from that; I pinch that one off and again there comes a shoot, which I leave for the thrip, who will stick to that shoot and

not touch the grapes. *Never take a leaf off your vines*, for it is they which help to fill the fruit.

About midsummer *the grape vine takes a rest*, then assist them for a couple of days with a weak solution of guano, and some days after that give them some potash water, the fruit will be more perfect. And this process has another value, it renders it entirely unnecessary *to trouble the vines during the summer.* The grape vine is a great feeder, and dead horses, night soil and charcoal placed within their reach are always acceptable to them, they are fond of phosphates. The strawberry is much benefited by tannic acid, notwithstanding the doubts of Mr. Hovey. The blackberry is much improved by cultivation. The raspberry canes must be buried in winter; they alway show whether the winter be very cold or very mild. *They should be always buried in winter.*

The secretary speaks of the use of gunpowder in destroying insects. My method seems to me better; I use a copper tube with four burners at one end, having large wicks to burn the nests and worms with the *burning fluid* so called. That is efficient and does no harm to the trees. As to killing them with ammonia, I put the worms into a vessel and covered them with triple F ammonia; I soaked them well, much to their apparent satisfaction, for *they were none the worse for that strong bath.*

Col. Travers—I have succeeded pretty well occasionally by putting gunpowder on a plate and exploding it under the nests when the families were at home.

Prof. Mapes—Gunpowder kills some but scatters others; little good results.

Mr. Robinson—Some use a roll of candlewick saturated with spirits of turpentine on the end of a suitable pole; it makes pretty sure work with the nests and worms.

Prof. Mapes—A clear flame is best. I have used my copper burners so well that now I have but little use for them on my farm.

Chester Coleman—Proper ladders may be well employed that we may reach every nest and destroy it. How can we avoid or kill the peach tree worm:

Prof. Mapes—In the first place be careful not to set the trees below the cotyledon circle, for if you cover that part with soil you injure the tree. I use boiling hot water on the foot of the tree; this being done at the right time cooks the worm in its hole, and moreover if you keep the trees in high condition by properly shortening in and the other known methods, the worm will seldom attack them; it is much more fond of trees less healthy.

Col. Travers—I have made a compost of fresh cowdung and ashes in equal parts, well mixed and applied around the base of the peach trees with good effect.

Prof Mapes.—My soda mixture kills insects. Heat soda red hot in an iron pot, this drives out of it the carbonic acid. Dissolve one pound weight of the soda in one gallon of water, wash the trunks and branches of trees and vines with this once in the spring and again in summer. It will kill all insects, clean off dead bark and mosses, and make them all smooth and polished. My neighbor Mr. Robert Rennie has used this wash liberally, and his trees all look as if they had been polished by hand.

Quinces are not raised sufficient for the market; the fine ones sell for more money than oranges; Scofield, of Jersey, raises such. He has received fourteen hundred dollars for one year's crop of one acre of quinces. Mr. Wilson, who is connected with one of our banks, is engaged in setting out quinces, and has grown some thousands of them, already yielding him wagon loads of fine fruit; they give a profit three times greater than an ordinary farm crop. The quince tree loves salt and soda.

WEEDS AND WEEDING.

Mr. Mapes—This was a most interesting meeting and elicited a fund of information which shall be long remembered by those who were present.

The remarks of Mr. Scott as to what constitutes noxious weeds we omit, as we hope at an early date to be able to publish a full article from him on this subject.

It was urged that a large class of weeds absented themselves from soils in perfect heart and balance, and although excess of organic manures in soils must necessarily encourage the growth of weeds, as well as of other plants, still, that the absence of the inorganic constituents of the useful crops from the soil, is generally the forerunner of a propensity to yield weeds in large quantities, whenever organic matter or stimulating manures should be added.

It was also urged that the frequent disturbance of the surface of soils, was unfriendly to the continued germination of weeds; for, whatever amount of weed seed was resident in the surface, upon portions germinating, they will be immediately turned under or exhibited on the surface to the action of the sun, thus giving opportunity for the germination of new quantities, and of other sorts, until, by a continuance or repetition of the operation, all the weed seed within germinating distance from the immediate surface would in turn be destroyed.

If a cabbage be taken from the ground and suddenly placed under the spout of a pump, then transferred to a jar of chemically pure water, the following facts will take place. The water will become turbid, white flocks will settle in a few hours, and after a few hours more half an inch of fine white matter, like starch in water, will be deposited, which, if poured around another cabbage, will kill it, and if poured around a beet will cause it to grow with redoubled vigor, consequently those materials which the cabbage rejects are good pabulum for the beet.

Many farmers sow oats to act as a mulch during the winter, and when plowed under in the spring, leaves the land free from fall weeds.

An anecdote was related by a member who had visited Mr. Reid's nursery at Elizabethtown. He stated that this nursery seemed entirely free from weeds; that he had remarked to Mr. Reid that he must be very industrious in the removal of weeds.

Mr. Reid said, "No, I run a cultivator between my trees sufficiently often to prevent weeds growing at all, and therefore I am never required to remove them."

Common salt, it was well known, would destroy a very large class of weeds, when used in quantities less than would be found deleterious to current vegetation.

Indeed, if the surface of the ground be covered with salt so thickly as to destroy all vegetation, that portion of soil the following year will be found more fertile than any other in its neighborhood, and entirely free from weeds.

A large class of weeds is also very easily destroyed by the burning of light substances on the surface of the ground, as gardeners prepare soil for cabbage plant beds, prior to sowing the seed, for the raising of those plants. The absence of some one necessary constituent of the useful crops often arrests their growth, and thus gives rise to that class of weeds which flourish best in full sunshine, which effect they enjoy from the absence of the intended crop. Those soils deficient of alkalies are often overrun with sorrel, and the same effects, to a limited extent, are to be observed from the absence of each of the necessary ingredients.

Much was said as to the style of tools which should be used to eradicate weeds. The use of the cultivator, instead of the harrow, does much to destroy weeds which are germinated; for, while the harrow plants many, the cultivator, if properly formed, is continually throwing them to the surface, roots up, so that they may be destroyed by the sun.

The ordinary hand hoe is not so good a tool for getting rid of weeds as the push or scuffle hoe. This, in the hands of a dexterous operator, in its forward action cuts off the weeds, while its backward motion spreads the cut weeds on the surface.

Many crops may be planted with greater width between the rows, and greater proximity in the rows, thus admitting of the use of the various horse hoes, most of which are superior, for the removal of weeds, to the ordinary cultivator.

The new horse hoe of Ruggles, Nourse, Mason & Co., when run at a slight depth, turns the earth from the rows toward the centre, and again spreads it evenly, and while doing so, and passing all this earth over a comb, leaves the weeds shaken free from the soil, root end up, on the surface. This tool is now coming into very general use for cultivating corn; for, after the ground has been once deeply plowed, before planting the corn crop, the continued disturbance of the immediate surface by flat cultivation with this hoe, will secure all the necessary conditions in well manured soil for a maximum crop, and keep it entirely free from weeds.

Mr. Solon Robinson offered the following remarks:

One of the best modes to get rid of weeds is not to grow them, and by a judicious and proper system of manuring they may be got rid of. Take the very land described by Professor Mapes, of Mr. Reid, at Elizabethtown, and let an old-fashioned weed growing farmer use it for five years, and he will have it as perfectly seeded to weeds as the most weedy farm the Professor knows of in New Jersey. The question arises whether weeds should be grown. If a farmer manures his land with stable manure, put on as it usually is, direct from the barn yard, before being properly composted, he might just as well take a basket in his hand, with the weed seeds in it, and go forth and sow them; for in spreading the manure he sows the seeds in it broadcast. I will ask the question of Prof. Mapes whether his barn yard will produce weeds, but I will venture to say you may spread it upon land already clean, like that of Mr. Reid's, and yet but very few weeds will be grown. The Professor, by his mode of composting manure, kills the weed seeds, and in addition adds materially to the value of the compost heap. Manure treated in a proper manner has the power to destroy all the weed seed contained in it, so that their power of germination is entirely done away with; thus it will be seen that land may be fertilized with manure that has no seeds of weeds. Who ever heard of weeds of any kind growing from Peruvian guano? What is there in improved superphosphate of lime, that great fertilizer, to produce weeds? If this manure be applied to clean land, because there are no weed

seeds in it, you can hardly grow weeds, so that there is nothing for the farmer to do but once get rid of them; manure properly, and he shall have no more weeds to attend to. It is true some seeds may be carried by the wind, but by his daily example his plan soon becomes adopted by his neighbors, and the result will be that few weeds will trouble him.

Mr. George E. Waring, jr., then said—The remarks which have been made on the subject of weeds recall to my mind a somewhat curious fact which recently came under my observation. In some of the more Eastern States, the easy cultivation of field crops is very much interfered with by a weed called wild rye or witch grass, a very troublesome and hardy plant. Farmers have observed that a single crop of turnips is sufficient to entirely eradicate this pest, and among many this is the means used to secure its destruction.

Such facts, and others of a similar character which might be named, lead us to the conclusion that the excrementitious matter discharged by the roots of one plant may be destructive to other plants growing in the same soil. If such is the case, it is possible that a proper application of botanical knowledge may enable us to do away with many weeds. I merely throw this out as a suggestion, other gentlemen may be able to give us more light on the subject. Perhaps it is of sufficient importance to command closer attention than has hitherto been given it.

It seems to me that simply clearing the ground of weeds is not all that should be considered in connection with this subject. The soil should be kept in a condition uninviting to the growth of weeds.

Prof. Mapes has told us that soils deficient in potash produce a class of plants peculiar to such a condition, and that in like manner soils deficient in soda produce a class of plants peculiar to this condition. The same effect may be observed throughout the whole list of deficiencies in important ingredients. From this it may be justly deduced, that if the soil be kept in the highest con-

dition, having no chemical deficiencies, it will produce the highest order of plants (grains, &c.,) and will be incongenial to many weeds; while if it has deficiencies it is not only liable to be occupied by plants of a lower order, such as many weeds, but the cultivated crops, struggling for growth under such unfavorable auspices, have less energy and power to subdue the intruders. Hence we conclude that our means of security against weeds is to put the soil in the highest state of fertility, and fit it for the cultivated plants, instead of weeds. It does not appear necessary that there should be a certain kind of seed in the soil before a certain kind of plant, peculiar to that seed, can be produced. If we place the soil in the proper condition for any order of plants, we may expect their growth, apparently without seed. Soils deficient in some of the inorganic elements of vegetation produce pine trees. This forest may stand for two hundred or three hundred years, during which time some of the elements which are deficient in the upper soil are collected by their roots, which extend to great depths in the soil, and are deposited in the wood and bark. If the forest be now burned, or if it decay, these matters become mingled with the surface soil, and so alter its character that it spontaneously produces the oak, or an analogous plant, and a forest of this growth succeeds the evergreen. No one would suppose that acorns had existed in the soil for the two hundred or three hundred years during which the pine trees were growing, still less that they had been produced by the pines. If we follow the changes still further, it is very likely we should find, that if the oak trees be cut down and removed, they would be followed by evergreens—not because they had produced the seeds of evergreens, but because, in their removal, they had carried away so much inorganic matter from the soil as to leave it better fitted for their production than of the oak. The scientific discussion of the theory of native production may be left to older and wiser heads. It is sufficient for the present occasion to know that such facts exist, and may undoubtedly be applied to the production of weeds as well as of trees. If the importance of removing and avoiding weeds be proportionate to the annoyance which they occasion, these subjects demand attention.

Prof. Mapes proposed, as the subject for next meeting, "The Potato—The best sorts and the best mode of Cultivation." *The rot interdicted!*

Adopted, and the club adjourned to Tuesday, June 6, 1854, at noon.

June 6, 1854.

Present—Prof. Mapes, Mr. Solon Robinson, Mr. Berrian of Illinois, Mr. Chester Coleman of Brooklyn, Mr. Barney, Dr. Wellington, Mr. Waring, Capt. Holmes, Messrs. Bergen and Bennett of Gowanus, Mr. Geo. B. Rapelye, Prof. Hooper, Mr. John Lodge, Mr. J. W. Chambers, and others—between 30 and 40.

George B. Rapelye in the chair.

Henry Meigs, Secretary.

Mr. Meigs read the following translation by him.

[From La Patrie, Paris, May 5, 1854. Received from our corresponding member, Dr. John G. Adams.]

BRUSHING OFF THE OIDIUM—THE GRAPE DISEASE.

Read to the Imperial and Central Agricultural Society and the Society for Encouragement of Agriculture, &c., on the 5th of April, 1854. *By M. Guérin-Méneville.*

Mr. Delamarre, who is animated with the desire, along with others, to give aid to our agriculture, volunteers the columns of La Patrie to its service, has called my attention to the experiments made at Neuilly by Mr. Regnault, to remove the oidium from the diseased grapes by means of a bird's wing or a soft brush. I went there to see the experiment with the editors of the scientific department of La Patrie. Mr. Regnault showed us his Chasselas grapes, ripe and in very good condition, on the same vines bearing bunches not experimented on, lost and covered with the oidium. All the other grape vines in the garden were ravaged by the disease. This result called for a committee from the Imperial Society of Horticulture to examine fully. The committee, after seeing the grapes of Mr. Regnault, made an unfavorable re-

port This gave rise to some unpleasant railery on the project; but the author, Lewis Le Clerk, having since seen my success on a large scale, in the department of the Lower Alps, has spontaneously rendered justice to the process of Mr. Regnault. The trial was made under the direction of the sub-prefect of that department, and the vineyard of Mr. Antoine Pellegrin examined. He had used the plan successfully for two years past. They chose the middle of the field, a double line of grape vines, one of which was treated with the soft brush covered with a dry white powder. The bunches on the row were soon brushed clean of the oidium, and in a short time the bunches resumed their verdure and shining aspect, thus distinguishing them from the unbrushed bunches which look as if covered with dust. From the time spent in so cleaning one row of vines, we conclude that the cost of cleaning from 500 to 600 kilogrammes, *i. e.* from 698 pounds to 712 pounds of grapes, will be about one centime—the fifth of one cent. The committee met on the 11th of September to prove the result of the experiment. They saw the most evident contrast between the appearance of the brushed and the unbrushed grapes. The oidium had not been renewed upon the brushed bunches. They met again on the 9th of the following October, when the grapes were fully ripe. The vines not brushed did not perfect one single grape! The brushing done properly, at the proper time, is calculated to save from half to three-quarters of a fair crop. Thanks to Mr. Eugene Robert, I brushed the bunches on a plantation of grapes of the extent of nearly two acres. I employed women at a cost of about fifteen cents a day. I kept an exact account of the entire cost of the brushing and the result was that the whole cost me nearly thirty francs—$6 for the 2¼ acres.

The brushing must be done at a certain period—neither too soon nor too late. The best time to do it is when the majority of the grapes in a bunch are covered with the oidium with a whitish sort of powder. This period varies with localities, &c. If brushed too soon it will be necessary to brush again. The operation is simple enough, as much so as weeding. The operator takes a bunch carefully in the left hand and brushes it from end

to end and side to side lightly, so the oidium is removed better and cheaper than by use of sulphur, washing, or other methods known.

(Signed,)

PLANCHE.

Professor Mapes reported by Mr. Lowe.

Professor Mapes made the following remarks:—In these days, when potatoes are sold at a high price, much larger than that obtained for wheat, and when it is well known that notwithstanding disease and all other difficulties pertaining to the potato, that still the farmer is enabled to raise at least one hundred bushels or more per acre, the importance of the crop cannot be doubted. English and Irish farmers could scarcely believe the fact that thousands of bushels of potatoes, not of the first quality, have been sold this spring in New-York at $2 and $2.25 per bushel. The increased consumption may be attributed in part to the immense number of immigrants received in our city. It will be remembered that 600,000 are said to have arrived within the last twelve months, and if we estimate that each of these individuals should use but five bushels of potatoes, which is a moderate estimate—for even at the present high price they will still be used by immigrants from the ease of their preparation as food—it will be seen that 3,000,000 of bushels are required, in addition to former crops, to supply this increased demand alone. I shall not enter into any lengthy discussion relative to the potato disease, for this has been so fully debated that the members of the Club are fatigued with its consideration In proper place, therefore, after describing modes of culture, I will refer to such remedies as are most readily applied, and as have been found to be most effective.

Culture.—In the culture of the potato it should be borne in mind that they are tubers, that the roots which are thrown forth never yield potatoes attached to themselves; the new growth always occurring on the stems, and hence the mode of culture should be such that after the proper number of tubers have ap-

peared upon the new growing stem, that no others should be induced, so that all the pabulum collected by the roots may be reserved for the use of the first formed tubers. If this rule be strictly adhered to, all the potatoes will be of full size, and we shall not have assorted crops, part large, part small, part ripe, and part unripe. I have found by practical experience that where the crop was cultivated so that all the potatoes produced should mature at the same time, that the disease is not so likely to appear among them. It always appears first upon those stalks or stems which have late formed tubers upon them, caused by the hilling up after the original formations from the covering of the stems to a higher point. General Beatson, of the British army, who commanded at St. Helena, at the suggestion of the Royal Agricultural Society, tried a great number of well-directed experiments in relation to the culture of the potato. He found that the proper depth to which the potato should be covered was six inches; that at a greater or less depth of covering the crop was less and of inferior quality. He also found that the largest and most perfect potatoes, when used for seed, would give a larger yield from the same number of pounds than any other size. He tried them of every size, at every depth, whole, cut in various sized pieces, the different portions of the potato planted by itself, the removal of the eyes from the potato, and their separate planting, and the result of all these experiments was that the largest sized potatoes covered to the full depth of six inches, with flat cultivation, and continued disturbance of the surface of the soil would yield the largest crop. Each of these experiments, even in its subdivisions, occupied a space of not less than one acre. All these experiments I have since repeated carefully, and the results invariably have agreed with those published by General Beatson. It will be remembered that a few years since, when potatoes were high in price, our President, Mr. Pell, suggested the propriety of cutting out the eyes for planting, and this was done with an ordinary chairmaker's gouge, which would remove a half sphere of the flesh of the potato behind each eye. The eyes should then be planted after being rolled in plaster, or partially dried, and the potatoes themselves used as food. I tried this experiment alongside of a similar weight of potatoes to those from which the eyes

were removed. I found that the eyes of one bushel of potatoes, occupying the same amount of ground, and all other circumstances being equal, planted alongside of a bushel of whole potatoes, would yield the same number of potatoes, but not of the same weight or size; their keeping properties were not so good, and they were more early attacked with disease. About the same time a German method went the rounds of the agricultural papers. It was stated that when the potato vine was one foot high its stalks should be pressed outward, laid down flatly, and covered with earth, leaving the ends only exposed. When they again become a foot high they should be pressed inward and again covered with earth as before, leaving the ends, as before exposed, and thus continue bending down and covering until the vines should show blossom, when the process should be discontinued. It was urged that the whole length of the stem so covered would put out tubers, and that when put under such treatment could be made to yield three thousand to one, being eight or more times the greatest number ever procured by the old style of cultivation. This process I also tried, and found the number produced to be immense, and fully equaling what had been claimed for it, but the size and quality rendered them valueless. Even the peelings of potatoes containing the eyes may be used as seed, but the result will not be equal to that obtained from whole potatoes. The rationale for these differences may be understood by observing what takes place when the whole potato, with a perfect skin, is planted. After the new growth such a potato will be found whole, and, to all appearance, the skin perfect, unbroken, and the original potato heavier than when planted, but upon a chemical investigation it will be found that all the starch has been removed to furnish pabulum for the growing plant, and has been replaced by water, rendering this original seed potato valueless. If the same observation be made upon sets or cut potatoes it will be found that the fleshy part of the potato has sloughed away, forming an acid portion of the soil in its immediate vicinity, and hence not furnishing starch in a healthy condition as pabulum for the new plant. The organism of the new growth, not having its proper food in its early stages, is imperfect, and the vines cease to bear potato balls or seeds. Practical farmers have been in the

habit of drying their cut potatoes, or coating them with plaster, before planting them, thus forming a false skin or coating; for the office of the skin of the seed potato is evidently to retain and protect the starch from coming in contact with too large an amount of the moisture of the soil, and thus arrest the decomposition, permitting it to proceed only so rapidly as to furnish its ultimate constituents as food for the new growth, while the ramification of the roots put forth, which are also greater in number from an uncut potato, go in search of the inorganic requirements, and supplies them even from a subsoil when properly disintegrated. Thus, then, it will be readily understood, why the potato has gradually lost its ball, why its organism is less complete than in former times, and why whole potatoes, protected by the outer sack of skin, as intended by nature, should be used as seed. All these facts lead me to the conclusion that Robert's plan for ameliorating the potato disease is not without argument.

It will be remembered that Mr. Roberts presented to our club last year some potatoes raised by his process, which were much heavier than those generally in market. The skins, though thinner, were stronger, and the eyes were even with the surface instead of being indentations. Some of those potatoes I have planted, and they give every indication of being very perfect. They kept through the winter with their original hardness, and were in quality superior to the same kind of potatoes grown by other methods. It will be remembered that Mr. Roberts claimed that potatoes were not perfect as early in the season as usually supposed, that, therefore, he left those potatoes which he intended to be used as seed in the ground, without being disturbed, until the following spring. He dug them up early before sprouting, and replanted them. He found the product from these potatoes much greater than from those dug in the fall. He found also the potato ball appeared upon them, and after repeating this process for three years the potatoes resumed the quality of twenty years ago, and gave results both as to quantity and quality, when used as seed, according with the results of that date. He also gave us the evidence of many growers that these potatoes when planted in the same row with others not so treated defied the

potato disease, while their neighbors were entirely de troyed. The preparation of the soil for the potatoe should consist in very deep disintegration with the subsoil plow, run in the bottom of the furrows, made with a two-way plow, for the introduction of the potatoe. This gives full depth for the running of the roots. The potato should then be dropped whole in these furrows and covered with three inches of dirt. As soon as the vine makes its appearance, another three inches should be added, after which flat cultivation by horse-hoes and cultivators should be pursued; thus the six inches of depth claimed by Beatson would always be maintained. The original tubers that first set upon the stems would alone appear, and all the pabulum collected by the roots and furnished from the atmosphere to the leaves would go to perfect these first tubers, producing them at or near the same size; whereas if the vines have earth placed about them to a higher point, the new tubers which will of necessity appear will rob those originally formed of their pabulum without perfecting themselves, thus rendering the crop of inferior quality. Some six years ago I commenced the cultivation of the mammoth nutmeg potato. This is a small potato, yielding but an ordinary crop under ordinary cultivation. I have, however, on one occasion succeeded, by adding precisely the missing constitutents of the soil, ascertained by analysis as wanting, in raising 350 bushels per acre, but generally with ordinary cultivation the crop of mammoth nutmeg is not so large as the mercer, and very much less than that of the merino and other cattle-feeding sorts. The quality of this potato, however, is superior to any other. It may be ripened in favorable situations by the 20th of June, and will be as hard and firm the following spring as when first dug; and whatever may be the size, and however new, they are mealy and fine flavored when cooked. Mr. James Campbell, of Weston, Somerset county, N. J., has cultivated this potato, every year planting his largest tubers, until he has more than doubled their size, and he now produces them equally as large as the mercer. I have sold all my crop for six years at $2 per bushel for seed, and never have been able to supply the demand. The various recommendations which have appeared relative to the mode of arresting the disease have not proved specifics, with the exception

of the mode proposed by Mr. Roberts; for while in some parts of the country, salt, potash, charcoal, muck, and a variety of other things seemed to arrest the disease, in others they have proved entirely inefficient. The mammoth nutmeg potato, however, has never been diseased. I have seen them growing in the same rows with other kinds, all of which have decayed, while the mammoth nutmeg refused to receive the disease, even when in immediate contact with the vulnerable source.

Manures.—The manures proper for potatoes, and that of all other crops, should first be of such ingredients as analysis shows to be absent from or deficient in quantity in the soil, and which the analysis of the potato shows to be necessary for its growth; but in soils fairly in balance, where large crops are required, some manures may be used for potatoes which are nearly or quite inert when applied to other crops; thus freshly dug muck taken from salt marshes, and thrown into drills underlaying seed potatoes, will be found to be an efficient manure, while the decomposition of this muck, consequent upon the abstraction of some of its constituents by the roots of the growing potato prepare it for minute division in the soil by the next year's plowing, and thus sandy soils may be made to yield large crops of potatoes, at the same time providing themselves with the conditions which will render them retentive of manures for all time. One member, Mr. Charles Dennison, President of the Grocers' Bank, raised last year 300 bushels of carter potatoes on an acre, by the use of the *improved super-phosphate of lime*, and this manure, combined with charcoal dust, is the only manure I have used for many years for the growing of this crop, during which time I have not had the disease in any kind of potato which I have raised, and this has included most of the known kinds. In Monmouth county, N. J., the potato crop is large, many farmers appropriating 100 acres to its growth, and many of them raising the common merino potato. This yields more largely than any other, except the Rohan, and although poor in quality during fall and winter, is valuable for early spring use, and from the high price potatoes have borne this spring, some of those farmers have rendered themselves wealthy by a single crop.

Prof. Mapes—Potatoes are raised in London in cellars in a sort of hot-bed. They are sold in the market for about thirty cents a pound. Their plants give no balls, and are unfit to re-plant.

Mr. Robinson—Well sir, we are paying at the rate of six dollars a bushel. Mr. R. read a letter from Timothy Dudley, of Jacksonville, Ill. Mr. Dudley says:

"I see by your reports of the Farmer's Club, in the Tribune, that your next meeting will discuss the subject of potatoes, and as I cannot be present to take part in your discussion, I send you some of my views upon paper. I think my mode of culture a very good one when potatoes are $1, or even fifty cents a bushel, and hope it may prevent the rot. At any rate, I should like to have somebody who is troubled with that difficulty in potato culture try the experiment. My method of planting is quite different from that of any other person I know. I put the seed in drills just wide enough apart to hoe between, and when the sprouts are up four or five inches, I draw them and transplant in hills where they are to grow, three sprouts in a hill. My second crop, May 26, is now nearly ready for transplanting. This method of transplanting has many advantages over the old one, especially as the young plants are as hardy as cabbages, and can be transplanted with as much, if not more speed, than those of the old method. Other advantages I will name:

First. When you have a choice kind of seed and but little of it, and want to make one bushel go as far as ten would in the old way.

Second. You can have your ground fresh plowed at the time of transplanting, and thus get a good start of the weeds, which is something of an object in foul lands.

Third. By transplanting, if the season is at all favorable, you get no small potatoes; they are of uniform size, and very good size at that. As a matter of course in transplanting any kind of vegetables, the best time is just before a shower, and care being taken to cover the long fibrous roots deep enough.

The *Fourth*, and last reason is not so clear to my mind as the others, but I am inclined to the belief that it may be done so as to prevent the rot, and the reasons for my belief I will give you.

Suppose that the cause of the rot is a small minute parasite insect that lives and propagates itself in the tubers; that decay follows as a matter of course, when a certain amount of heat develops the disease; that the seed, when planted, retains the germ of the disease, and passes it over to the new vegetable, whenever it is matured sufficient to receive the germ of the parasite. That this has been the cause of the potato rot is plausible, because it is the genuine law by which all parasites perpetuate themselves, and no good reason can be given why this vegetable should be an exception.

After the sprouts are drawn, consign the potato deep within the compost heap, or the flames, and the work is done. On the other hand, if my theory is not correct, the tubers can be replanted, and thus be made quite prolific in bringing up another young family.

You will allow me, if you please, to remark in conclusion, that I hold to the belief that the diseases which afflict the animal as well as the vegetable creation, are nothing more than the operation of one general and universal law; that a disease has never yet afflicted man, but that some simple remedy is placed within his reach—so simple, indeed, that it is altogether beneath modern philosophy to search after it. The same rule exists in the animal and vegetable kingdoms. The only difficulty in the way is, that most men do not search at the foundation of the evil, but cut off the top to effect a cure of the root.

Mr. Bergen, of Gowanus, desired to know how the tubers which are left in the earth just as they grew, are to be protected from freezing?

Prof. Mapes—By leaving them untouched, covered by their haulm, which operates as a mulch, they are not protected from freezing, but from too easy thawing; like my cabbage plants in my cold beds, covered only by boards, where they freeze solid,

but thaw so slowly that they are not in the least degree injured. On the contrary, I sell such winter plants for *a dollar*, and the spring planted for twenty-five cents.

Mr. Robinson—Mr. Roberts, of Michigan, who has so well succeeded in raising sound potatoes, covers his potatoes with leaves.

Mr. Bergen—We are in the habit (on Long Island) of plowing up our potato fields to put in turnips, and we often find sound potatoes after being a winter in the ground—more after some winters than after others. All on the surface are killed by the winter.

Prof. Mapes—The potato left as it grew, has what may be called a jacket about it, which is a cause of safety. They must not be disturbed at all.

Mr. Robinson—They bear the cold when left in their natural positions.

Mr. Meigs—Has found apples as well as potatoes entirely sound in the soil after a severe winter. They were however at least ten inches deep, and I supposed that their safety was owing to their having been frozen but once, and then very gradually thawed. The apples had lost their good taste.

Prof. Mapes—I have often noticed that such potatoes as had been disturbed were spoiled by the cold.

Mr. Bergen—Have you much clay in your soil?

Prof. Mapes—Yes, sir; and kellis and hard pan.

Mr. Bergen—Does your land compact?

Prof. Mapes—I have deeply subsoiled my farm and underdrained it, it therefore does not compact, as I will illustrate by drawing with chalk upon this board. [The professor here exhibited drawings showing how the excess of water was entirely withdrawn from his deeply disintegrated soil. Rain had no effect whatever in compacting his land.]

Mr. Bergen—After we have ploughed our land much it packs, but my potatoes are good. I feel in doubt what to say about

planting cut potatoes. Some of our folks plant thirty acres apiece; for this market they cut their seed potatoes pretty small; they think they get the largest potatoes that way. But there are some sorts of potatoes that will bear cutting so. If there is in a potato any inclination to rot, it wont do to cut it. When whole potatoes are planted, we do not find it sound generally after the growth, but we find merely a skin if any thing, and we think it best for the growth of the new crop that the seed potato should be used up.

Prof. Mapes—We find the seed potato occasionally as sound apparently as when planted, after the new growth from it; but on examination I found that all the starch had been extracted to supply the new growth, and the place of the starch filled with water. An imperfect potato when planted will be entirely destroyed, but not a perfect one having its proper quantity of starch.

Mr. Robinson—I am obliged to leave the Club, but I wish to propose a subject for next meeting before I go, viz.: "The most appropriate period for cutting grass and for harvesting grain." Adopted.

Dr. Wellington—I well remember some experiments tried by my father on potato raising. He made five rows of considerable length, and tried different manures in each row, and that which was treated with salt, by sprinkling some around the plants soon after they came up were much the largest.

Mr. Bergen—I have been in the habit of keeping some of my potatoes out of doors, buried in pits, with a covering of earth over them some eighteen inches thick, hilled up. I preferred it to my cellars; but I have lost some bushels of those in pits by severe freezing sometimes.

Mr. Waring—Then they must have been frozen and thawed more than once.

Professor Mapes—Potatoes in their natural position in the soil, with their stalks still attached, pass off surplus moisture through the capillaries of their stalks—something as a wet towel hanging

over the side of a tub of water will draw all the water out of the tub like a syphon. I find that my potatoes, left as the grew, are surrounded with earth comparatively dry, each potato having its jacket of drier earth next to it.

John Lodge—I have been a working farmer and gardener almost half a century. I say plant your potatoes in land plowed and subsoiled very deep. A friend of mine from Nova Scotia was here recently with a cargo of his own potatoes, of which he had last season 300 bushels an acre. He sold his cargo for $5,000. Plant none but the best and largest *whole potatoes.*

Mr. Bergen—The whole potatoes require many more for planting than the cut ones. We expect as many potatoes as there are eyes in the seed. For early ones we want but few shoots. My friend, Mr. Bennett here, thinned out his shoots and got a diminished crop. He expected earlier and larger ones.

Prof. Mapes—The number of the eyes constitutes no rule for the number of tubers. Beatson's great experiments on potato growing form a lesson, the truth of which my experience constantly confirms. He planted whole potatoes with the most valuable results. The experiments were on several hundred acres, and of the most exact and registered operations. Some persons, in forming judgments in agricultural matters, are fond of judging by the eye, as they say—a very uncertain judgment as to amount of crops. One says that corn has a hundred bushels on an acre, not thinking what the ears are. He can be mistaken one half by not noting that in some ears the diameters are nearly double—and of course the shelled corn—that of others.

An Irishman planted potatoes lately on a portion of Newark meadows, and raised 500 bushels of very large potatoes on an acre. He digs a spade and a half deep, putting one digging on another, so forming beds, keeping the land always in perfect tilth.

Mr. Bergen—I always thought the cutting of potatoes for seed a questionable method, yet some of the best and largest potato growers among us on Long Island do cut their seed potatoes to

the smallest sizes. There are conditions to which all the operations must be subject, making great differences in results—we don't know why. I have known the smallest potatoes left of a crop, planted the next year, and producing the largest potatoes—and I have planted the largest potatoes sometimes without any advantage gained.

Prof. Mapes—I was a pupil of the celebrated William Cobbett when he had a farm on Long Island, nearly forty years ago. A man there by the name of Poole, followed Mr. Cobbett's plan of planting whole potatoes, and deep tillage; for want of the unknown subsoil plow he broke off the mould board of a common plow, and subsoiled so far with it. He raised fine crops of potatoes; they brought in New-York market $1 a bushel, while other potatoes would sell for 30 cents a bushel only. Mr. Cobbett left us, went to England; Poole began to cut his potatoes, and very soon sunk to the 30 cents level. On Cobbett's plan he used to have about 220 bushels per acre.

Mr. Bergen—I was brought up to the whole potato planting, and was led to cutting my seed potatoes by the success of my neighbors in their crops from cuttings. I lost a bet against a bushel of potatoes from one potato.

Prof. Mapes—In that case, space is to be considered. I will pay the difference between the crop from the whole and the cuts.

THE SEVENTEEN YEAR LOCUST.

[Report of John Hooper upon the insect called the Seventeen Year Locust.]

The insect usually called the locust is, in fact, not a locust, neither in genus, family, nor even in order, being an insect of the *order homoptera*, and of the genus *cicada*. Whereas, the locust is of the genus *locusta*, and of the order orthoptera. These two orders of insects differ from each other so materially in formation, habit and characteristics as to compel this difference in classification. It appears to have attained the vulgar name of locust from its resemblance to the eastern locust in its periodical appearance, in such innumerable multitudes, though not in the devastation which they inflict upon vegetation. The true locust is an enor-

mous devourer, having powerful jaws. The cicada cannot eat, having no jaws, being only furnished with a proboscis, or sucker. The true locust has opaque wings, the upper ones very narrow, and the under ones expansive, forming a semicircle. The cicada has transparent wings, the fore wings being more expansive than the lower ones. The true locust has the power to hop, having long hind legs. The cicada never hops, having very short hind legs. They are, in fact, not locusts but *cicadæ*. But as the seventeen year and the dog-day cicada are so familiarly known to us as locusts, after thus defining their true position, in the remainder of this report I shall call them by that familiar nomenclature.

The seventeen year locust, or *cicada septemdecim* of Linnæus, is of a black color, the thick anterior ridge and large veins of the wings, orange red; the eyes, when living, and the rings of the body are also reddish; expanse of wings two and a half to three inches. They generally appear in oak forests about the middle of June, but are by no means confined to those trees, but visit forest trees very familiarly. After pairing, the female pierces a moderately sized bough, forming a groove therein, in which she deposits from 15 to 20 eggs. This nest she carefully covers with the small splints which she had removed by means of the piercer and saw with which she is provided. She then proceeds above on the same bough, makes another fissure and another nest, and another, and so on to the end of the bough. One female has been observed to deposit over fifty such nests in one bough. She thus continues providing for the succession of her kind until she becomes so exhausted that she falls to the earth and dies. Soon after the eggs are hatched the punctured limbs mostly wither and die, thus frequently blasting a whole orchard, or even forest.

Dr. Potter says the eggs are 52 days in hatching. The young, at first, are somewhat grublike, being but the 16th of an inch, of a whitish color, and even then there are four little prominences on the thorax, which contain the germ of its future wings. Under its breast is a long beak or syphon for suction. Upon its deliverance from the egg its first effort is to reach the earth, which it accomplishes, not as is generally supposed, by the bough breaking off, but they instantly run to the side of the bough, take a

leap, without reason, experience or memory, and thus gain their position, when they immediately burrow, follow the roots of plants, using their beaks to imbibe the vegetable nourishment. They never descend very deeply into the earth, but remain about the tender fibres of the roots. The only change they appear to undergo in their subterranean pilgrimage of seventeen long years is increase of size. As the time of their transformation approaches, they rise to near the surface of the earth, form cemented cells, in which they pass their pupa state, after which they burst the skin on the back and ascend the first tree, and again perform their septemdecimal offices of generation.

Dr. Potter states, that during several successive nights he watched over 1500 pupa arise from beneath one apple tree, and in six weeks the whole generation had passed away. They have many checks to their increase. The growth of the tree frequently encloses them, and the eggs perish. The young are eaten by ants and some birds most greedily; and when their subterranean pilgrimage is accomplished, and they form their waterproof cells for transformation, hogs devour them in vast numbers. The first account we find of this locust is in Secretary Morton's Memorials, in which he says, "There was a numerous company of flies, which were like for bigness unto bumblebees, which appeared in Plymouth in 1663. They came out of the earth by little holes, and did eat up the green things, and made such a constant yelling noise as made the woods ring of them, and ready to deafen the hearer."

Judge Davis, in his Appendix to Morton's Memorial, states that these insects appeared in Plymouth and Sandwich in 1804, which differs one year from the stated period. Rev. E. Goodwin says, the locusts appeared in Sandwich 17th June, 1821. Their last previous appearance was in 1804, and previously to that in 1787. I have carefully collected these facts from occurrences of events, says he, which transpired on locust year, and which events all concur with these dates. Mr. G. states that he particularly noted the actions of myriads, but never saw one eat a single morsel, their entire action being that of procreation.

Authorities upon the history of *cicada septemdecim* are Dr. Landell, of Pennsylvania, whose account appears in 4th vol. of Mitchell & Miller's Medical Repository; the Columbian Magazine, vol. 1; Mr. M. Bartram's, in Dodsley's Annual Register, 1767; Dr. McMurtie's, 8 vol. Encyclopedia Americana; Dr. Hildreth, 10 vol. Silliman's Journal; Professor Potter, Baltimore, pamphlet of Notes on the Locusta. Dr. P.'s catalogue of appearance and dates upon which he could rely are as follows:—Maryland, 1749, 1766, 1783, 1800, 1817, 1834. South Carolina and Georgia, 1817 and 1834. Pennsylvania, 1715, 1766, 1783, 1800, 1817, 1834; New Jersey, 1826. It is therefore evident that this species of cicada is nearly universal in the States, and the dates all agree save one year in relation to their periodical visitations.

Subject for next meeting, proposed by Solon Robinson,—"Best periods for cutting grass and harvesting grain."

The Club adjourned till Tuesday, June 20, at noon.

H. MEIGS, *Secretary.*

June 20, 1854.

Present—Messrs. Solon Robinson, Prof. Mapes, Geo. B. Rapelye, Judge Scoville, Mr. Brush, Mr. Wells of the house of Fowler & Wells, Geo. S. Watkins, Messrs. Waggoner, Waring, Stebbins, Barney, the Corresponding Secretary, Peter B. Mead, Hon. N. Burchard, late Consul in Switzerland, Mr. Darracott of Boston, Judge Van Wyck and others, about 30 in all.

George B. Rapelye in the chair.

Henry Meigs, Secretary.

The Secretary requested Mr. Burchard to speak as to the wood gas, and he replied as follows:

Mr. Chairman and Gentlemen--While I held the post of U. S. Consul at Basle, in Switzerland, it became my duty to watch closely the scientific and industrial progress of the great German family, to which our country is so much indebted for a large

class of useful and estimable em'grants. This is the country of Humboldt, Liebig, and a host of other distinguished and profound naturalists, who have contributed so much to develope the agriculture, manufactures and commerce of the age. It cannot escape attention that the inventions and discoveries of the last half century have greatly contributed to cement the bond of nations between the nations. Among these I am happy to say that I witnessed, about eighteen months ago, the introduction of gas made from wood into the rich and cautious city of Basle, under the eye of Prof. Schonbein, the inventor of gun cotton, one of the ablest chemists in Europe. It has been found on trial that wood is a cheaper and better material for the manufacture of gas in lighting houses and cities, like those of Switzerland, remote from good fossil coal, than the latter substance; besides, the article made from wood gives a more brilliant light and less offensive smell than that yielded from mineral coal.

It is known to scientific men through Dr. Dingler's Polytechnical Journal of July, 1851, that more than three years ago this invention was tested on a large scale in the railroad depot at Munich in Bavaria, where the inventors reside. Some time before this event the invention had undergone a severe scrutiny and proved practicable. It was, however, reserved to Prof Pettenkoffer, the inventor, who was an assistant of Liebig, to initiate the scientific and industrial classes of Europe into the nature of the invention by a public lecture, which was reported in the Kunst and Gewerbeblatt of Feb., 1850, published in that city. But we all know the various and great difficulties which are to be overcome in order to bring a discovery into a practical and economical shape. No wonder then that *five years passed away* before this very important invention reached its highest perfection.

I remember to have read that the chemist Emil Breisach, whose name is mentioned in Dr. Dingler's Po ytechic Journal of July, 1851, published in the city of Augsburgh in Bavaria, was called by the authorities of that city, he being at that time superintendent of the gas works, to visit Munich, with the view to examine wood

gas. The experiment that he made there shows that 100 Bavarian pounds of wood yielded in 65 minute's distillation, consuming 50 to 60 lbs. of coak during the process, 759 Bavarian cubic feet (which is smaller than our foot) of pure and inflammable gas and 20 pounds (Bavarian) of charcoal, and that its power of giving light was 20 per cent superior to that of mineral coal gas. Different kinds of wood yield different quantities and different qualities of gas.

Mr. Breisach is now in this country, and has secured a patent for this invention from our government, it having been previously obtained from most of the European States. It is said that he has made large sacrifices to bring the subject before the American public. He is now with his brother, L. R. Breisach, engaged in a neighboring State in showing on a large scale the merits of the invention, and to awaken our enterprising citizens to its importance. We hope to see this useful invention introduced into our cities and towns remote from the great coal beds, where wood is comparatively cheap.

Mr. Burchard observed that the Bavarian pound is somewhat less than ours. As to the success of this gas from wood, no doubt exists of it in a country abounding like America with wood. A long time will the wood continue to supply the settlers of this vast forested continent with pure gas, better than any from mineral coal, not only in immense districts in which there is no coal, as also some abounding with coal and wood. The celebrated inventor of gun cotton, Prof. Schoenbein, has already supplied the city of Basle in Switzerland with the wood gas. It is there where wood is scarce, and is worth six dollars and a half per cord. It illuminates lecture rooms and others superbly, with scarcely any offensive smell like that from coal gas.

George Darracott, of Boston, remarked that there might be found evil in the use of a gas whose presence could not be detected by its odor. It migh fill rooms insensibly and cause dangerous explosions, an accident not likely to occur from coal gas whose presence is too strongly perceived to pass unobserved.

Mr. Burchard said that although the wood gas was perfectly perceptible to the smell, still it did not possess the highly unpleasant smell of coal gas. In the manufacture of wood gas the retorts are much corrugated (wrinkled) in order to gain an extensive surface. Basle is supplied with the wood gas 20 per cent cheaper than our coal gas. Prof. Schoenbein labored four years at this new gas.

Mr. Darracott—You are aware that gas from wood is made in Newark, New Jersey.

Mr. Burchard—From resinous woods; that of Schoenbein is from all woods. It may be made from peat or other combustible substance as well as from wood, resin or coal.

Mr. Darracott—The wood gas will require purification by the usual methods, such as passing through lime, &c.

The Secretary reminded the club of the extraordinrry fact that in Buenos Ayres, on the Rio de la Plata, some thirty years ago, owing to the lack of wood and multitudes of sheep, that the latter were used for fuel extensively. The fleeces being taken off, the bodies were dried in the sun perfectly, and then served to bake the bread, boil the kettle, and since to drive the steamer. They made steam out of mutton!

Solon Robinson—And on our vast western plains, where wood is scarce, our hardy citizens bake and boil with buffalo chips—the dropings of the herds of the great grass eaters, the buffaloes.

The Secretary read the following translations, &c., made by him:

[Revue Horticole, Paris, 1854.]

USE OF COLLODION IN GARDENING.

We live (says Mr. Lindley, in February last,) in the midst of an atmosphere of wonders. A few years ago the world was filled with astonishment on learning that a harmless, delicate down could take the place of gunpowder for force. Soon after that an ingenious druggist discovered that this same gun cotton could be

used to cicatrize wounds. Now, when dissolved in ether, it serves, under the name collodion, to furnish gardeners with an unexpected means of multiplication of plants.

Collodion is truly one of the most drying of varnishes—adhesive, impenetrable to moisture and air. Mr. Lowe has availed himself of these admirable qualities to multiply plants by the cuttings. He supposed that by covering the lower end of the cutting with collodion it would more slowly absorb the moisture from the soil, and thus cause the cuttings to take with greater ease. He therefore applied a covering of collodion over the end of the branch taken from the tree. In five or six seconds this covering became dry, and the juices of the branch hermetically sealed up. The budding is afterwards done in the ordinary way.

In order to try the plan thoroughly, Mr. Lowe made comparative experiments. The cuttings were divided into many parcels, each having the same number of species. Some had collodion applied, others none. The plants were selected both from the conservatories and from open air. The experiments proved the great superiority of the plants with collodion. It is good for grafts, and better when over it a thin slip of gutta percha is put.

THE ORANGE GROVES OF BLIDAH, IN ALGERIA.

An important matter for Blidah and Koleah. They have growing 23,680 orange trees, giving them an annual revenue of 114,805 francs, upwards of $22,000. This does not include the citrons, lemons, cedrats and bergamots.

An Arab never labors in his orange garden. He never prunes or manures his trees, and gathers stinted, poor fruit. Orange flower water can be made largely and profitably.

[Annales de la Societe Imperiale d'Horticulture, Paris, March, 1855.]

Mr. Jamin asserts that pears grafted upon seedling pear stocks are never as good as on quince stocks; that the seedling stock sends its tap roots deep into the soil in a perpendicular direction, which causes the tree to be slow in making fruit, and their juices to be watery, being drawn from the lower bed of the soil, where the root is deprived of the beneficent action of the atmos-

pheric influences, making the fruit less savory than those from the grafts upon quince stocks. We all know that the roots of the quince naturally extend through the surface soil a little below the surface. In our Fruit School our oldest pears, grafted upon seedling pear-stocks, are about twenty-four years old; they bear abundantly every year, but are never equal to those on quince stocks. I have noticed a striking difference between the two, in favor of the quince stock, for forty years past. I do not mean to be understood as saying that this is true under all circumstances. Not so; for in very light, warm soils, where quince is never vigorous nor lasting, pear stocks ought to be used, and they (the pear stocks) do well in hedges, where they are subject to gales of wind, for they are strongly and deeply rooted. It is said the graft on quince will only last about forty years; but what of that, if it bears fine crops of fruit so long? But we know that some of these have lasted to 150 years of age. We do irreparable injury to the quince stock *by digging about it with the spade! A barbarous treatment! Mutilation of the roots and spongioles so near the surface.*

EXPERIMENTAL GARDEN.

Tomatoes.—We have raised from seed of large, yellow, round tomatoes a tomato of a yellowish cherry red color.

The Taylor bean—a new one, which we owe to the House of Vilmorin—is a remarkable one. The beans are flat, and of great diameter. They are much sought for in England.

Mr. Orbelin laid before the members an engraving representing pears, supported on their branches in an inverted position, and he said that this was favorable to the development and quality of the fruit. Messrs. Mason, Orbelin and Jacques were charged with the care of verifying it.

Mr. Vattemare announced the receipt of thirty-one packages of seeds of American trees, sent by General MacRey. He also presented copies of letters from Mr. Hannibal Hamlin, chairman of the Committee on Commerce in the United States Senate, showing the advantages of the metrical system of France, and proposing its

adoption by the United States—that petitions for that effect were signed throughout the Union. The President thanked Mr. Vattemare for his services for this object.

[London Farmer's Magazine, May, 1854.]

DEALERS IN ARTIFICIAL MANURES.

Dixon & Cardus, of Northam, Southampton, advertise, among many articles, "Animal Guano or Dried Flesh Manure. Prepared in the Argentine Republic, South America, by a patent process granted by the Argentine Republic solely to them."

Pond Mud.—"Some three or four years ago, as an experiment, we drew out of the bottom of a pond, filled during the season with back-water from the canal, but dry in the spring, about fifty loads of mud, which was applied immediately to the land. For the first and second years it seemed to prove a decided injury, but after being turned up with the plow and subjected to the action of frost for one winter, the beneficial effects began to manifest themselves, *and the best of our barn-yard manures* have not produced so heavy a growth of grain. *And the effect promises to be permanent.* Probably a better way would have been to have piled it up for one year, or composted it with lime or other manure."

(Signed) R. MERCHANT.

[Annales de la Société Imperiale, Paris.]

For some time past, we have cultivated the Amaranth Mirza, from China, as a substitute for Spinach. The seeds brought last year from that part of China near Russia, produced three varieties considered by M. Jacques as new to us. When sown broadcast, it produced for two months an abundance of large leaves, and quite tender.

Our colleague Mr. Thompson, the chief gardener of Chiswick, (England,) has shown to me a new dye plant brought from the north of China, by the celebrated traveller, M Fortune. It is an indigo (Isatis indigotica.) Having been planted last spring, we saw it in September, in good condition, and leaves developed, and has just finished its flowering. Mr. Thompson remarked that a

handful of the fresh leaves plunged into pure water insensibly turned it to an indigo blue. We obtained some seed from him and planted them. We have compared this plant with ordinary pastel, (indigo plant,) from which it differs materially. In the fall we gathered leaves enough to enable our learned President, M. Payen, to analyze it. And it was proved to contain a rich and abundant dye. M. Fortune says that the Chinese cultivate it largely to make indigo, and also to *color green tea.*

Mr. Masson further stated that at the Exhibition of Horticulture and Agriculture at Moscow, in 1853, he saw the enormous roots of a Stalice which grows spontaneously in Chinese Tartary and parts of Siberia, where the root grows sometimes as large as a man's leg. It is employed to tan skins. The chemists say that it contains *twenty-two per cent of tannin*, nearly double that of the oak or the birch. (Meigs—Some of the Stalice are beautiful herbaceous plants, ornaments of a garden.)

Among the sorts of flax of the Crystal Palace of 1851, in London, we found two new and remarkable varieties. The first was called American flax, bearing a white flower, which we have compared with the blue flower flax, and have found that notwithstanding its uncommon height its textile qualities do not appear to be constituted like those of the blue flowered flax, but by way of compensation, its seed gives more oil than the blue flower.

The second variety, called Lin de Viatka, given to us by M. Lodet, one of the representatives of Russia at the Crystal Palace, has short stems, large fibre, solid, blue flowers, seed in large capsules, *three or four times more in quantity* than our ordinary flax.

A third kind, the Pscoff flax, is recommended by the Imperial Society of Agriculture as the richest for solidity and fineness of fibre.

We hope that some of the friends of American agriculture will send for seed of the Viatka and Pscoff flax, and grow them here.

The Secretary said that the very extraordinary discovery of gun cotton by Professor Schoenbien is followed by another of high value, and that is, by putting the warlike gun cotton into ether,

it dissolves and forms one of the most useful articles for a thousand purposes. With a brush we cover a cutting or a graft, and in *six seconds* it forms an impenetrable skin, preserving the cutting, &c., for a considerable time, for budding and grafting. Laid over wounds, scalds, &c., it almost immediately stops the pain, and goes on rapidly to cure. Every family ought to have it always on hand.

Solon Robinson—I know an excellent use for it. A beautiful girl may be saved from being disfigured by the small-pox, by covering up the pustules with collodion, with a soft brush. I recently had the small-pox terribly; I just lived through it, and that's all; I tried collodion on my face, but was rather late in the application. Yet I am not marked as I should have been without it. In malignant erysypelas, cranberries are highly curative, but collodion might prove better. It is a cure for all cuts, and all cases of abraded cuticle, for it is in itself a perfect artificial cuticle. In case of scalds its application is painful for a moment, but the ease comes immediately. I pronounce it to be above all inventions on the face of the earth, the most precious.

Mr. Wells—Our surgeons use it. Mothers will find it far preferable to doing up wounded fingers in rags, and far more healing.

Mr. Watkins—It takes the place of the old-fashioned bandages and serves a better purpose.

[London Repertory of Patent Inventions, No. 137, May, 1854.]

Mr. Meigs—To preserve seeds, &c.—Jackson's patent. Take sulphate of zinc, or any of the salts of zinc, one pound of the dry salt to twenty pints of water. Potatoes, washed clean, and cut in usual sizes, steeped in the solution for twelve hours. The water must be boiling when the salt is put in, and when cooled down to 100 degrees of Fahrenheit.

The Chairman stated the subject for the day—"The best time to cut grass and to harvest grain."

Mr. Robinson—Call up Mr. Waring.

Mr. Waring—I am not ready, sir.

Mr. Robinson—Then I will go on with the question. Last week I visited the farm of the Phalanx, in New Jersey. I found them cutting fine grass—very fine, but I thought it too green to cut; there must be too much labor in drying it. And this practice prevails over our country to a great extent. I think that timothy, which gives a very nutritious seed, ought to stand until its seed is ripe enough to grow A great many farmers contend for their own theory and practice of letting grass stand for hay until the seed is nearly or quite ripe, because it is so much more easily cured, and also that it is much more nutritious, the seed being equal to corn or oats. The straw, however, cannot be any better than dry wheat straw.

In perfecting its end, all kinds of grass undergo a chemical change, and the stalk loses its saccharine. Witness the experiments with corn stalks in the manufacture of sugar. If the seed were permitted to remain upon the stalk and ripen, it would not make sugar. So, undoubtedly, it would be even with the sugar cane, which does not bear seed in this country; but if it did, the cane would have to be cut before it ripened. In cutting a crop of grass for hay, it will unavoidably happen that some of it will mature, and therefore a farmer who has a great deal of it to do should begin as soon as his earlier fields have attained nearly their full growth, as he will lose much less by that course than by waiting for it to mature. Grass should be cut when it is the sweetest, and then, if well cured, the sweet will remain in the hay, and will be eaten greedily and afford more nutriment than dry stalks and seeds.

Prof. Mapes, being requested, said: That he did not feel as competent to it as to some other field of experiment. He had not so large experience as some others. However, having paid some attention to so interesting a matter of the farm, I will speak of it as a scientific question, if you please. All chemists know that starch which is a product of grasses is not soluble in water, but is so in sulphuric acid. I have made sugar from corn stalks, and know that the change from sweetness to acidity readily takes place, and when this takes place in grass, its hay is not so good for animals. Ripe grass contains more silex and woody fibre

than green grass and is not so easy of digestion. Starch changes to sugar, and sugar to acidity as the plant ripens. Sugar is developed by stirring flour and water together, so that when properly worked, the water has a sweet taste as if it had been sweetened with sugar. All experience shows that all plants should be cut in that state in which the saccharine principle is most fully developed, and then cured for hay in the shortest time possible to do it well, and housed from weather, and be as little exposed to the open air as possible, *whether it be dry or wet*. Our President, Mr. Pell, closes all the openings in the barn where he keeps his hay. One effect of this is to keep the hay *green in color* to the last of the season. Grass grown upon land properly prepared and manured for that purpose is *more readily cured* than other grasses not so treated. An animal will choose the straw which has grown upon land properly treated as to its organic constituents, &c., in preference to that from lands not in right condition.

Mr. Solon Robinson—The remark of Professor Mapes in relation to grass from a sweet and proper soil keeping better than others, is fully proved by the grass of a bog meadow, which is known to be the most difficult kind of hay to keep sweet in stack or mow, because it grew upon a sour soil. There is no doubt that great additional value can be given to hay by feeding the roots of the grass with such constituents as will make the hay a rich food for the cattle. The curative power of grasses depends upon their perfect organism. The same number of pounds in weight do not decide, for the constituents will differ in the hay. Cattle decide readily which parts of a pasture are most properly treated in every particular, by feeding up to the very line established by a proper over a bad treatment of the pasture. As they require phosphate of lime, soda, &c., prepare a part of the pasture with these, and other parts of it without, and the cattle will point out with an unerring precision, which man could not, the lines of boundary of the proper food. I ought to remark here that an ancient complaint of the pasture giving out, is owing to its never having been properly tilled or subsoiled. When thus deeply and properly tilled, the grass however trodden by the hoof, tillers out new shoots, and the pasture lives.

Mr. Robinson.—Before members begin to separate, let us fix the subject for the next meeting. And unless members prefer something else, I move "The relation between an increase of crops and an increase of national prosperity." That subject was unanimously adopted.

THE BEST TIME FOR CUTTING THE GRASSES AND GRAINS OF OUR COUNTRY.

Judge Van Wyck—The practice of late cutting of the grasses, or not cutting them, until the seeds got hard and ripe, arose, in a great measure, in England, from experiments made by Mr. George Sinclair, in the employ and under the patronage of the late Duke of Bedford, in about 1820. Professor Johnston, one of the greatest agricultural chemists of the age, thinks the practice erroneous. In our country the same course has been pursued, and is yet, to a certain extent, springing probably from the same source. In both countries the general practice now is to let the grass have a good growth of stems and leaves, and cut it immediately when the flowers are fully blown, except timothy, and this last when they begin to fall. It is thought the juices and saccharine matter of the plant are in the best state to make the most and richest food for animals. They are not dried up and lost by evaporation, but absorbed in the plant. The first makes more wood, the last more nutriment. The stubble of the cut grasses is greener and will grow up sooner—advantages certainly worth securing. Grain, especially wheat, with us, is generally left too long in the field before cut. It gets too ripe; the flour is not so good for it. Much of the wheat is lost in gathering, particularly the bearded, which easily drops from the cup that holds it. Experiments have lately been made in England on the advantages of cutting wheat early, even two weeks, or near it, before fully ripe. It yields a greater quantity of handsomer and sweeter flour from eight to ten per cent more in weight. The straw of the earlier cut wheat makes better food for stock and better manure for the land. The stem is not all dried up to mere wood; it contains some of the sap it did when in a green state, and cattle will eat more of it; and from the same cause the residue, which is left as litter, will ferment and decompose sooner, and make a richer

manure. The practice generally among our farmers has been to let their wheat get fully ripe before they cut it. Some lately have pursued a different course, and, no doubt, benefited by it, they have put the sickle in earlier. They must take care though and not be too early. The kernel should not be in full milk, otherwise the grain may shrink and sustain injury.

Professor Mapes moved that the Secretary be requested to prepare for the club at its next meeting the census of value and quantity of cotton, corn, oats, wheat, rye, hay, wool, sugar, barley, tobacco, &c. Adopted.

The Professor intimated that one single inch deeper ploughing in the whole Union would produce more wealth than all our imports, including the gold from California.

The Secretary thought that six inches deeper ploughing wo ld nearly double the agricultural products, which cannot be estimated at less than three thousand millions of dollars in a single season—therefore worth, in only eight months of the year, all the gold of California for sixty years, at the present rate of about fifty millions of dollars a year.

Professor Mapes—I aim to show also that the tobacco (supposed much of it to be Havana), is grown in our neighbor State Connecticut, and on the lands adjacent to the shores of our Lake Erie.

The Club adjourned to the second Wednesday of July (the regular day being 4th of July) *i. e.* the 11th of July, at noon.

Subject—"The relation between an increase of crops and an increase of national prosperity."

H. MEIGS, *Secretary.*

July 11, 1854.

[Postponed from the 4th (the 1st Tuesday) on account of the celebration.]

Present—Messrs. Lawton, of New Rochelle, Waring, Van Wyck, Dr. Waterbury, Mr. Waggener, Paul Stillman, Solon Robinson, Judge Scoville, Professor Hooper of Brooklyn, and others—19 members in all.

Mr. Lawton in the chair. Henry Meigs, Secretary.

James Athearn Jones.—A communication from him was read by the Secretary, containing just remarks on agriculture. "Land requires its breakfast, dinner and supper of healthful and nutritious food. No living creature can subsist upon *concentrated* food alone. It must have volume, and I believe weight. No lasting renovation of soil without liberal use of barn manures. Deep and frequent ploughing cannot make fertility any more than the human body can be raised from 'skin and bone.'"

Mr. R. Ryan.—Communication was read relative to the culture of the grape, which he is well acquainted with practically and theoretically from the first agricultural, horticultural and botanical schools of Europe; is a member of the Royal Agricultural and Horticultural Societies. He refers to Alexander H. Stevens, M. D.

Mr. Lawton was requested to explain the uses of the bayonet hoe, invented by the late Judge Buel. Mr. Lawton showed its use as a small plough or cultivator, it being readily drawn six inches deep; and it is an excellent hoe when its sides are used, and all the better for having its handle, necessarily, on one side, thereby working better about the plants than the common hoe. The figure of this new and admirable hoe is that of a short bayonet, that is, some seven inches long, whose thick end terminates in a goose neck and deep socket in which the handle is inserted. Both edges of it should be kept sharp to cut weeds well. Mr. Lawton also exhibited his path hoe, which is a narrow blade secured to an arch, with a socket for the handle. He uses this to cut up the weeds in his garden paths. This hoe is about ten inches wide. Another smaller similar hoe has a small rake on the opposite side. The Club was much pleased with the Buel bayonet hoe.

The Secretary remarked that success in the field much depended on the implements employed. Nearly 40 year ago he joined his learned and amiable friend Dr. Mitchell in recommending well tempered, highly polished ploughs. He had, long before that, left off the use of our common iron spades and hoes, and

employed a good workman in cutting tools to make his spade and hoe of *trowel stuff*, so hard that no stone could injure its edge, and so thin that the spade was driven by hand instead of foot, up to the hub, polished as a razor. It entered the ground with twice the facility of the old rusty or half rusty iron spade. He said that with such spades he was able to dig 2,600 square feet of ground thoroughly in one day, and dance in the evening, while two men with the old iron spade dug no more ground in a whole day. The same may be said of the thin steel hoe. These implements he always kept perfectly polished and sharp. Dr. Mitchell witnessing the excellent efforts of these polished implements had a plough made of iron, perfectly polished, and sent it to the Emperor of Russia about the year 1817, and received the warm thanks of the Emperor, and a diamond ring said to be worth five thousand dollars.

The mechanics of America are the most lavish of cost as to their instruments of labor of any men that ever lived. They are right. Moral writers have long said that great art and cost are lavished on the arms of war. They glitter in the rays of the sun. Even a *scoundrel cannon has elaborate ornaments on his breech!*

WHEEL CULTIVATOR.

Solon Robinson said, that as new implements were in order, he would mention a new one which he had lately seen in operation at the North American Phalanx, in Monmouth County, N. J. This is the wheel cultivator, so hung upon the axle of a small pair of wheels that it can be raised in a moment from the ground, when moving from field to field, and it can be regulated to any depth, or in case of rising next to a row of trees, it can be set shallow next to the roots, and deep on the other side. It is an excellent implement for peach orchards, and answers next to the drill for putting it in wheat, leaving it in rows. The wheels keep it steady, and the work is much better done than with the ordinary cultivator, and equally as well as with gang ploughs. It requires a strong pair of horses, or good yoke of oxen.

The Chairman remarked, that Judge Buel's bayonet hoe has not yet come into general use, notwithstanding its unquestionable merit.

Dr. Waterbury said he was pleased with reading the reports of the proceedings of this club. He had noticed at a recent club-meeting some authoritative recommendations of collodion in the treatment of burns, wounds, abrasions of the skin; that it was in fact an artificial cuticle curative by perfect exclusion of air like the natural skin. This error he, as a professional man, felt it his duty to correct. Admitting the utility of it, as recommended for vegetable uses, such as securing grafts, &c., his experience with it as an application to abraded skin, &c., was such as to convince that nature cannot be supplanted in the process of cure by artificial means Nature produces in due time over the wound a scab more or less porous, and precisely adapted in the shortest time to effect a cure, a dressing prepared by the Lord 6,000 years ago. While under collodion inflammation ensues, and cure is difficult, Dr. Waterbury objected, therefore, to the recommendation to have a quantity of collodion in every family for application to abraded flesh. There was something remaining in the collodion after its formation from *gun cotton in ether* which rather favored inflammation. He recommended caution and careful experiments before leading the families of the United States into an unfortunate dependence on collodion.

NEW HARVESTER.

Mr. Wagoner introduced the model of a new reaping machine, which is calculated to collect the heads and separate the grain from the chaff, and deliver the grain in bags. He had one machine in operation at Racine, Wisconsin, this last year, that cut at the rate of twenty-five acres a day. A machine will weigh about 1,200 lbs. and cost $150. The cutters can be raised or lowered to suit the height of grain by the operator, the heads being carried directly to a thresher and cleaner, and the grain thence to a screen and the bags. The whole is mounted upon four wheels, with a body capacious enough to contain all the machinery and carry the bags and man to fill and tie them up. The inventor says that two horses are sufficient propelling power, and these are hitched to a shaft behind, so as to push the machine into the standing grain. One advantage of this mode is, that it

leaves the straw upon the land and the heads require less labor to thresh.

Judge Meigs read a letter upon the subject of manures. The writer thinks highly of all concentrated fertilizers, but thinks they will always prove far more valuable when used in connection with farm yard manures. He also spoke highly of the use for grass of unleached ashes, by which he doubled the crop.

Paul Stillman, of the Novelty Works, observed that rotary cutters would be preferable to those of Wagoner's harvester. He compared the action of the vibrating cutters formerly used to shear cloths to those. They were so severe in action as to shake the building where they were employed. An ancestor of mine invented vibrating shears for cloth, and took out a patent.

The Chairman said that it might be well to have a lighter harvester and mower, one that could be propelled by one horse. The machines are much wanted, for good mowers are scarce and charge high, and large quantities of hay are either injured or wholly lost for want of being mowed at the proper time. I think it would be a good plan for two or three farmers to join in the purchase of a first machine for their common use.

Mr. Solon Robinson said that one of his friends at Bedford had one which readily accommodated itself to uneven surfaces. Why cannot a machine be made to cut grass, while mowing, into short pieces? Ketchum's machine creeps over stones as large as my head with ease; it acts like a sled in that.

The Chairman called up the subject of the day, viz: "The relation which an increase of crops bears to national prosperity."

Upon this subject Mr. Geo. E. Waring, Jr., of New Jersey, a late student of Prof. Mapes, and author of a new elementary work upon agricultural education, made the following remarks:

Mr. Chairman, the subject of the day is one of more general importance than any which has for a long period engaged the attention of this club. Combining, as it does, a review of past ex-

perience and the tendency of our agricultural influences, it is a proper one to be considered during this anniversary month of our nation's independence. Its national character needs no explanation. The first effort of the early white settlers of America was the production of food for their necessities, and with the increase of civilization and prosperity, the cultivation of the soil has ever been the direct object of a majority of our citizens, until now (as we observe by the papers of the Secretary) agriculture is the monument of America, manufactures and commerce bearing to it the same relation as the forge for sharpening drills bears to the quarry where stone is being procured. The direct effect of increasing our amount of crops must necessarily be to increase our present wealth and reduce our taxation. From the seventh census of the United States we learn the corn crop of 1849 was about 600,000,000 of bushels, worth, at the export prices of that year, $300,000,000. Large as this amount is it was about one-seventeenth of the money value of crops raised that year. That we may see the value of slight improvement, let us suppose that by a better system of cultivation the amount of crop might have been increased 5 per cent, that 105 bushels of corn might have been raised in the place of each 100, and that the same proportion might have been attained throughout the whole crop. This increase would be worth $255,000,000, a sum equal to one seventh of the cash value of all the farms in the country, one-half the value of the live stock, or double the value of all the farm implements and machinery used to conduct the agricultural operations of the United States. Should you deem the small advance of 5 per cent too great to be reasonably expected, *reduce it to one-tenth of that amount*. Suppose that one-half of 1 per cent could have been added to the crop of '49, the increase of value would have been $25,000,000, enough to defray nearly one-half of our government expenses; a sum which, applied to the advancement of agriculture, would yield a yearly return of 5, yes, 10 per cent increase in our national productions. What other branch of industry, Mr. Chairman, have we among us which would so amply repay us for protection? Surely not manufactures. Our factories are worth less than our horses; our steam-engines and water power less than our horned cattle; the labor of our mechanics

less than the increase of our swine, and our railroads, I think, less than our farm fences. Neither is it our commercial relation with other countries, for (Chinese as the mode of reasoning may be) could the Atlantic and the Pacific oceans never again be crossed, except for the transportation of mails and passengers, ten years experience would show us the advantages of such isolation. But, sir, it is not to the importance of immediately increasing the productions of our soil that I wish particularly to call the attention of the club. This is so evident, from actual figures, that there will be no difficulty in comprehending it.

There is another fact which requires consideration and action—a fact on which must depend our ultimate prosperity as a nation. I allude to the fact that the more we increase our crops, under our present system of management, the more we reduce the actual wealth of our country. Our efforts towards advancement have been short-sighted; we have looked to present ability to spend more than to future ability to produce. The man who lives on a bank deposit of $10,000, and each year draws out $1,000, will, at the end of ten years, find himself deprived of his resources. The farmer who possesses in his soil the inorganic elements of 10,000 bushels of grain, and yearly removes the elements of 1,000, without making proper return, will, at the expiration of ten years, find his soil denuded of its capital stock of nutriment. The nation which is possessed of a limited amount of fertilizing matter (and all matter is limited), and which pursues such a course of cultivation as tends to take more from the soil in the shape of crop than is returned to it in the form of manure, must, sooner or later, find itself bankrupt in those properties without which no nation can exist. This, sir, is not mere theory; it is painful truth, now being hastened to a practical development by the labor of nine-tenths of our self-styled practical farmers. Our tendency is toward destruction. The sweat of the nation's brow falls in the furrows of America like the tears of a child mourning for its mother's increasing debility. But, sir, what are the facts? Look at New England—once so fertile; her avenues are covered with emigrants moving westward, seeking for their labor that remuneration which their native States have ceased to afford. Look at

old Dutchess—the banner county of New-York. She once produced an average of thirty or forty bushels of wheat per acre; she now produces less than sixteen. Look at the Mohawk and Genesee valleys, and the same deterioration will be discovered. The same may be seen in many parts of Ohio, and in the oldest settled portions of the once called "inexhaustible" far West. Massachusetts, though adding 300,000 acres to her improved lands, decreased in ten years 12 per cent in her hay crop, 600,000 bushels in her wheat, 160,000 sheep and 17,000 swine, and increased but slightly in her neat cattle. New-York in five years added to her cleared land 671,692 acres, and shows a decrease of

Horses,	58,141
Milch cows,	68,066
Other cattle,	127,525
Sheep,	2,090,624
Swine,	566,092
Potatoes, bushels,	7,255,066
Peas and beans, bushels,	1,182,054
Flax, lbs.,	1,956,485
Wool, "	3,793,527
Wheat, bushels,	270,724
Buckwheat, "	450,724

While the increase of other products was only in proportion to the increase of population. Kentucky and Tennessee have decreased in their production of cattle and horses. It is estimated that the river bottoms of Indiana have decreased 33 per cent. in productive capacity, and in many parts of Wisconsin the average yield of wheat is but half what it was twelve years ago. These instances might be multiplied, but it is unnecessary. The fact that we are becoming less and less able to raise maximum crops is too evident to be disregarded, and true political economy renders it necessary for us to arrest our downward progress. This requires us to improve our system of manuring. We must return to the soil everything that we remove from it, or else the balance of trade will be against us. Until we do this it is worse than useless to urge deep plowing, subsoiling, under-draining or

pulverising the soil by digging machines, &c. We deprecate our ancestors as skinners of the soil; the next generation may with equal propriety call us its butchers. We are less generous than our predecessors, for they left the soil unrobbed below a depth of a few inches, while we, with our improved implements, search the very life-blood of fertility, and render future improvement more difficult. No man, Mr. Chairman, can coolly examine the facts and deny the truth of this opinion. Some means must be employed to prevent the universal impoverishment of the soil from proceeding further. What these means are this club may with profit discuss at a future day, for so long as every river in the land is freighted with the constituents of the soil, every city a waste-pipe for the wholesale dissipation of fertility, every barn yard a tributary to larger wastes, and every vessel which carries the productions of our soil to a foreign country without returning its equivalent, a poison to our life, giving us no antidote in the agricultural products of other countries—so long will the subsoil plow, the draining spade, and every other improved implement for increasing the productiveness of the soil, be a curse to the country—so long will he who deepens his furrow but inflict a deeper wound on the fortunes of his successors—so long will the increasing of agricultural products of the country be an insurmountable barrier to prosperity.

Solon Robinson—Our young friend has given us some very interesting facts—good subjects for thought—but has only glanced at the terrible destruction of soil and consequent decrease of production in this country. Start from here and travel through all the southern States, and you will see millions of acres that have been ruined—land that was once productive now bearing nothing but old field-pines and broom-sedges. The land has been washed away by the system of plowing up and down hill, till waters that were once navigable have been filled up and changed to dry land. It is even doubtful whether the cultivation of cotton has not proved a curse rather than a blessing to the States where it is grown, for it has rendered vast tracts of land unproductive and too poor to support a sparse population. The system is to cut down and destroy the timber and the soil, and then run off and

destroy somewhere else, leaving the old plantation to grow up again to worthless forest trees. I hope this subject will be continued and more fully discussed at our meeting next Tuesday, as it is one that we should all think more about; we should think that however much an individual may increase in wealth, if in doing so he destroys the soil so that all future generations must starve, his increase of crops and wealth is an injury instead of a blessing to the body politic. The chairman asked if we could not devise some plan to bring back the rich soil from the bottom of the rivers to the land? We should rather devise a system of tillage that will prevent the land from washing away. It should be a rule in all hilly countries that every slope should always be plowed level—no matter how long or how crooked the rows are; let them wind round the hill and always plow by the plum and level. When it is necessary, put in side-hill ditches to carry of all the water and save all wash and loss of the soil. I move that the present question be continued, and that the subject of a better system of agricultural education to be introduced into our common schools be also discussed.

Mr. Solon Robinson would like to discuss the question, "Ought all farm products to be sold by the pound?"

Mr. Wagoner said that the true union of all the proper elements of soil by true cultivation, reminded him of our glorious national line "United we stand, divided we fall. He that takes the food from his ox soon loses the labor of the ox. He who ruins his land, scrapes off all vegetation, and leaves it all bare to a burning sun, does likewise.

Mr. Solon Robinson—We are cursed with *a parcel of old antiquated notions in agriculture* which prevent us from doing what we should do and can do forthwith—that is, *raise twice as much on an acre as we now do.*

Chairman—The remarks of Mr. Waring to-day are excellent, and very suggestive; they are worthy of and require deep consideration. Our lands lessening its yield fearfully! We might tremble for our lives ere long if that be so and no preventives

applied. We must resort to those rich deposits made by our waters bearing them from our farms.

Mr. Solon Robinson—We had better take proper measures to prevent our vegetable riches from being swept away by the waters, and that can be done by various means requiring good sense and *industry, industry!* Yes, sir, *industry!*

The club continues the subject to the next meeting, with another proposed by Mr. Solon Robinson, "Advantages of Agricultural Education."

The Club then adjourned to July 18th, at noon, being the third Tuesday.

H. MEIGS, *Secretary.*

Present—Messrs. Dr. Waterbury, Solon Robinson, Prof. Hooker, of Brooklyn, George B. Rapelje, Mr. Waring, George Bacon, Judge Van Wyck, Judge Scoville, Peter B. Mead, M. Wagener, and others—19 members in all.

George B. Rapelye in the chair. Henry Meigs, Secretary.

Mr. Meigs said that he said he seldom spoke of any matter as original with himself. There was so much well said upon all subjects by other men, that he had almost confined himself to selections from works in various languages, especially from the valuable assemblage of works on every subject at Paris.

Agriculture requires the best roads as well as the best implements to carry on its gigantic and invaluable work. We are now familiar with this vast motive, but I have deemed it not unjust to myself, and possibly useful to others, to speak of what I have formerly done in regard to them, and of the result of my thinking for some forty years and more. The future will prove their truth.

In 1809, the writer first noticed the principle of substitution of solid rails of wood or iron for the wheel tracks of roads. Led to

it by the then great question of a canal from the lakes to the ocean, I studied the history of roads—the tram road being the first grand improvement after the Appian way, the common paved road, and the McAdamized roads. More than 100 years had passed away since man first saw a good iron way, but not the first steam carriage.

In the Legislature of New-York, in 1818, I first publicly asserted the reality of steam drivers of cars on a long iron railroad, with an *average velocity of fifteen miles an hour!* curves rendering it necessary to move slower. In 1850, the average velocity of the railroad between New-York and Philadelphia, owing to curves, &c., has not exceeded *sixteen miles an hour*, so that my theoretical velocity, as declared in the Assembly Chamber, in 1818, was right within one sixteenth part of the real practical velocity, at the distance of thirty-two years. The same had been written by me and published in the National Advocate, in 1816, when M. M. Noah was editor. He prefaced my article (which was signed M.) by saying that there might be something in it, but to him the author seemed to be a Don Quixote. Such was the opinion upon railroads 38 years ago.

I have, with others, admired the progress made in velocity on railroads up to even *one hundred miles an hour*, *on straight roads*, which has been done in England. But I entertain views of railroad velocity far beyond any yet ventured to be expressed. The Emperor of Russia has taken the first great step toward what I deem the ultimatum of railroad travel.

Instead of cutting a narrow alley through the country, or going around everything in the way of a straight line, he has cut a broad way, 500 miles from Petersburgh to Moscow; he has made it all the way *two hundred feet* wide, so that the engineer sees everything that comes on the road!

Such is part of the future; the railroad from point to point a mathematical line; the rails ten times stronger than any now used; the locomotives on wheels of far greater diameter, say twelve or fifteen feet; the guage of a relative breadth; the signals and

times perfectly settled; the road walled on both sides, during the transit of trains having the gates of the walls all closed. Then instead of *one hundred miles an hour*, we shall more safely travel *three hundred miles an hour!* I will not pretend to say more. One hundred miles seems fast enough, so did twenty, a few years ago, and now, on very unsafe rails or some straight runs, we do travel safely sixty miles an hour in this State, and in England one hundred miles have been accomplished.

Mathematical precision and time will solve this wonderful problem—a passage from New-York to San Francisco in *ten hours.*

Solon Robinson—I have no doubt upon a perfect level straight line, made sufficiently strong and smooth, this lightning speed may be attained, but what I am thinking of is this, how will you stop?

Judge Meigs—We must begin a hundred miles this side of the station to shut off steam. There would be no need of the proposed exhausted air tubes to send expresses through, if we had perfect rails. It does not seem any more Quixotic to talk of those hundred miles an hour than it did forty years ago to talk of fifteen miles.

DO KING BIRDS EAT BEES?

Judge Meigs read the following communication from Mr. John Hooper, of Brooklyn Institute, the gentleman who first introduced this subject to the notice of the club, and through our reports to a world of disputants upon this question, "do king birds eat bees?" Mr. Hooper says:

It may be remembered that about two months ago I made a report upon various common errors and prejudices prevalent among farmers generally, respecting many of the most familiar things which every day surround them. In doing this I suggested the necessity of looking into these simple matters, instead of being content with the *ipsi dixit* of our grandfathers in the matter.

Among other errors and prejudices I pointed out the fact, which is a prevailing one, that a farmer considered it almost a religious duty to destroy the king birds, because, forsooth, their grandfathers had done so, to prevent them from *eating the honey bees.* This I pronounced as a vulgar error, and a detrimental prejudice, which ought to be banished from all intelligent society, as it was in opposition to all known facts in natural history, and contrary to all known laws of philosophy. I carefully put this proposition forth in a suggestive form, and in so mild a manner that I did not conceive the possibility of offence to the most scrupulous stickler for antiquated notions. But every newspaper has had its exasperated correspondent, denouncing my presumption and ignorance.

One of the writers denounced this Society as mere book farmers; but one of your members has given him a quietus. The same writer stigmatizes me as an ignoramus, in my knowledge of the king bird in particular, and as a *know nothing* in general. Another belligerent writer states that not only does the king bird eat bees, but that he dissected one he had shot, and the bee actually *flew from his crop.* But I have made earnest inquiry among various keepers of bees and practical farmers, upon whose intelligence I can rely, and upon putting the question unprepared to them, "do king birds eat the *honey bee?*" one and all, without exception, pronounced "yes." "Are you sure?" "Yes, I have seen them do it, and always shoot them therefore." "Are you sure it was the honey bee, and not the *drone* only?" "You stagger me; I cannot tell, I did not think of that." In three instances they resolved to watch the bird take several bees, then shoot him and send the bees to me. But, to their delight, in no case was a bee found, and nothing but *coleopterous* insects, and they have resolved never again to suffer a king bird to be destroyed with their consent. Instead of regretting the discussion which has taken place on this subject, ungenerous as it has been on my opponents' side, I rejoice that it will advance the truth of science, exalt humanity, and vindicate the works of God, who formed the king bird, and invested its nature to subsist wholly on insects, and to take those on the wing; and in making such

instincts not to lead its victim to certain death, which would be the case if any king bird or other fly-catcher were to eat a honey bee. One of these writers says I know nothing about king birds, bees, or anything else than books. I have learned one thing from books that he has not, I have learned how *very little it is I know*, and how much there is to learn.

Dr. Waterbury, of Delaware county, N. Y., exhibited the model of a cultivator plow, invented on purpose for cultivating carrots, which is so contrived that it loosens the surface, cuts up the weeds, and leaves the soil in the same position without turning a furrow slice. It is a cheap implement, and it is thought by members present that it would be a useful tool for some purposes. It has no mold-board, the outer edge of the wing of the share is turned up so as to turn the dirt inward. For common use it is not so good a tool as Langdon's cultivator, because it does not like that rake out the weeds.

RELATION OF INCREASE OF CROPS TO NATIONAL PROSPERITY.

This subject, continued from last week, was now called up.

Dr. Waterbury, of the city of New-York, late of Delaware county, said, the statistics of Mr. Waring seem to prove that there has been a falling off of the principal grain crops of Dutchess county in the last few years. I am unable to say, sir, from what sources Mr. Waring has derived the amount of ploughed land. The amount of improved lands in that county is said by the census to be decreasing and yet I am disposed to attribute this to the disposition of the farmers to give in their land to the tax assessors at as low a figure as they can. And yet, sir, we must not forget to observe that on the last ten years there has been a very marked increase—an increase too marked to be a mistake in the production of hay; and in the last five years an uncommon increase in the amount of the production of rye.

This county Dutchess, as well as Westchester, which I will add to the same list, has been engaged lately in buying Western stock and fattening it for the New-York city market. For all our pur-

poses Schoharie county is as old a county, and yet removed from those influences, while the statistics show a slight decrease in the amount of improved lands in that county, they show a steady increase in the aggregate of productions for the ten years under consideration.

I have here, sir, a table which I have prepared from the United State census of 1840, the New-York State census of 1845, and the United States census of 1850—a table of the rates of variation of the principal agricultural productions of the State for the period of ten years. Of the three columns, the first shows the ratio per cent of increase or decrease on the first five years, from 1840 to 1845. The second shows the same thing for the next five years, *i. e.* from 1845 to 1850, while the last shows the ratio on the ten years from 1840 to 1850.

	1840 to 1845.	1845 to 1850.	1840 to 1850.
Improved lands,	....	+ 5½	....
Hay,	....	...	+ 20
Wheat,	+10	— 1¾	+ 8
Rye,	— 0⅓	+33	+ 40
Corn,	+36	+28	+ 70
Oats,	+30	+ 5	+ 32
Buckwheat,	+59	—11	+ 69
Barley,	+20	+12	+ 40
Potatoes,	—20	—33	— 50
Horses,	....	....	— 11
Asses and mules,	....	....	+
Cows,	....	— 5½	....
Butter,	....	+ 0⅓	....
Cheese,	....	+33	....
Sheep,	+25	—50	— 25
Wool,	+44	—29	+ 2½
Hops,	....	....	+500
Maple sugar,	....	....	+ 2½
Swine,	—20	—33	— 52

From this table it will be seen that the production of hay and the great cereal staples is increasing in a much faster ratio than that of improved lands—that wheat and rye, to a certain extent,

reciprocate each other, an increase in production of one being attended with a decrease in that of the other—that the production of corn and barley is subject to the least variations from disturbing influences—that the quantity of potatoes raised has been steadily decreasing—that we have actually less horses than we had ten years ago, a result attributable probably to the extension of railroads—that the number of asses and mules among us is probably increasing—that while cows were decreasing in number, 5½ per cent, the production of butter from the same cows increased a little, and that of cheese fully one-third, a result which must denote an improvement in the breed and method of management—that while the number of sheep has been decreasing on the last ten years, the weight of fleece has been steadily advancing until the two pound fleece have become two and a half, a fact that leads to the same conclusion with regard to the breed of sheep. Indeed, sir, in 1849 we produced with one-quarter less sheep a little more wool than we did in 1839, and it is a fact which dairymen are coming to understand very well, that a man may so overstock his pastures as to produce the less butter.

It is possible, sir that these statistics may be a little exaggerated, but when I consider the three independent sources from which they are derived, I am satisfied that they are true in the main, that there are not errors enough to materially vitiate them, and that the conclusions we derive from them are worthy of confidence.

And now, sir, although these statistics show no just cause for alarm, it is well to inquire into this matter—the connection between agricultural productions and national prosperity a little further. What is wealth? A gentleman of this city took occasion, a few days since, to enjoy himself, with some of his friends, in a pic-nic excursion to a secluded spot at a few miles distance. He was so thoughtless as to provide himself with money as a substitute for a basket of refreshments, and the result was, that he was dependent on charity for his dinner. Money is not always wealth.

There is a section of this state not a hundred and fifty miles from this city, but full seventy miles from any great avenue to

market, by either railroad or water, where two years ago last spring if potatoes could be sold at any price they brought ten cents a bushel, and the purchaser would remark, as an excuse for paying that, that they surely ought to be worth something. Potatoes are not always wealth.

Many men in this city are making drudges of themselves down town twelve and sixteen hours a day for the privilege of putting their names on the door of an up-town parlor and sleeping there. If such a man's property is all invested in his house, and he contrives to occupy the whole of it, he may be poor, yes, sir, very poor, indeed; houses are not always wealth.

There is an anecdote attributed to a very eminent member of Congress to this effect: A gentleman traveling in the southwest took occasion to stay over night with a friend, and in the morning walked out with him to look at his possessions. When he saw his friends expose of barren acres he allowed his countenance to express the commisseration that he felt. Seeing this the southerner cheeringly remarked that he was not so poor as appearances seemed to indicate, for one of his neighbors owned part of that. Lands are not always wealth.

Those streets, those very pavements that we tread, have been trod by a child of sin and sorrow—one whose genius could give rise to those wonderful combinations of words and sounds which once heard, haunt us in after years; and yet the author of "Bells" and "Ammabel Lee" was "doomed in scanty poverty to roam." The ability then to minister to the caprices of the rich or to the comfort of the masses is not always wealth.

The connection between wealth and prosperity (individual or national) is so generally conceded, that we have assumed it here. We are finding that though wealth is dependent on surplus produce, yet if that surplus remains undisposed of, unsold from any circumstance of inability or negligence, it is worthless. We venture to assume, then, that wealth and its consequent prosperity consists in having a surplus to sell, and in buying with that surplus what we wish of foreign products.

Nor are these desires for foreign aliments, for foreign fabrics, and for foreign conveniences unworthy of our nature. It is, sir, by the noblest of faculties that man has rendered himself independent of the vicissitudes of the elements, has established an artificial climate, feeds himself on the varied productions of all regions, and in fine, sir, perfects his civilization. Instead of reducing his natural forces, and of appropriating the natural resources of a country, or even a continent, he is subduing the world to his dominion.

The farmer, in common with other men, even in his rural seclusion, feels these wants. They must be supplied by the sale of a portion of the produce of his farm, and any system of farming that does not take into consideration this necessity is unworthy of our serious attention. As the nation is made up of individuals, so its exports are subject to the same laws.

It is a fact that in the world's history the interchange of commodities between nations has always given rise to great cities. Tyre, Venice, Amsterdam, London, and New-York are examples of this principle. The growth of the city is the actual tariff laid upon the trade, and provided the goods pass through but one city, indicates the amount of benefit conferred on two nations. The conclusion to which we come from these considerations is, that surplus produce, *unsold*, is worthless—that it is better to sell it for whatever it will bring, and that what we get for it is clear gain.

If, then, we must provide for exports, it is well to inquire into the sources of waste, that we may realize the most profit with the least loss.

The principal waste of inorganic matters to the country is probably connected with the exportation of pot and pearl ashes.

With every hundred pounds of grain that leaves our shores for Europe only from two to two and a half pounds of ashes are taken away, and of these ashes only about one-third are potash. There is a little larger portion of phosphoric acid, and these two ingredients are the only ones of any consequence. I have not the

statistics of the exports of ashes at hand, but I have no doubt that a computation from these data would show that the waste from this source alone exceeds that from all other exportations. But, sir, when we compare the exports of bread materials with the home consumptions of the same, and remember that of the inorganic constituents of the bread and meat consumed at home almost nothing finds its way back to the field, the exports of grain appear to be of very insignificant importance.

The burning of the primitive forest, and the gathering up of the ashes and the selling of them to the asheries for ten or twelve cents a bushel, is an evil that ought to be corrected. If the voice of this organization could reach to every farmer in the land, I am sure, sir, it would say to him, "Don't sell the ashes for this mere pittance; they are worth a great deal more to you than that." This evil is not entirely confined to the exportation, for the insoluble residue has accumulated in heaps around the asheries until of late enterprising men have found that it will pay to carry on this manufacture, and depend for profit on the leached ashes alone for manure.

It is probable that the fertility of Western lands is due to the decay and combustion of the annual growth of grass, furnishing them with a top-dressing of strong ashes every year. If with some great plow, such as Milton's angels might have used, the Eastern forests had been turned under one hundred and fifty years ago, we should have had a soil equal to the Western States. Alluvial deposits along our rivers prove this.

But we have seen, sir, that notwithstanding all this waste, our crops are still increasing, and increasing, too, faster than the improved lands from which they are produced.

What are the compensating influences that are producing this result? Is it the imports of guano into this country. During the period which these statistics cover that importation was insignificant. Was it the return of a very small portion of the inorganic materials of the crops from the city to the country? That was but a drop in the bucket, and a very small drop, sir, between 1839 and 1849. The result must be attributed to great natural

causes. It is in the order of Providence that lands thickly peopled and well tilled should become more and more fertile, and it is only in new countries where land is very cheap that there is any departure from this law.

The first of these recuperative influences is the action of water. I quote from Christison: When water contains of saline matters more than $\frac{1}{2000}$ it is scarcely fit for use.

" $\frac{1}{4000}$ it is called hard.

" $\frac{1}{8000}$ it will still lather with soap.

" $\frac{1}{16000}$ it may be used for mixing medicines. The Thames water contains $\frac{1}{3000}$. Panira says spring water containing not more than $\frac{1}{6000}$ of solid matter is rare in England. In addition to these saline ingredients, there is almost always present organic matter.

On the same authority the Thames water contains $22\frac{1}{2}$ grains of solid matter in every imperial gallon. To say nothing of sewerage water, there is a great deal of swamp water in this country that might be allowed to run on the surrounding arable lands that is much fouler than this.

Of the vast amount of water that falls on this continent, but a small portion of it ever reaches the sea. The most of it soaks down through the porous portions of the earth until it meets with a bed of some compact strata, and then runs along that and makes its egress in the form of a spring. In its passage it dissolves out salts and brings them to the surface. In many portions of this State the springs are hard for this reason. In Otsego county, water of wells which runs through blue clay or lies on it is hard. In Schoharie county that which runs through or lies on limestone rock is hard. But springs of the softest water are bringing to the surface of the earth continually inorganic salts, and although the amount per gallon may be small, when we reflect on the immense quantity of water that runs from them, and the small proportion of it that ever reaches the sea, we find the vast resources that are still left to the surface of the earth. The medicinal springs of Saratoga are examples to the point.

One theory of the saltness of the sea, attributes it to the influx of saline materials from the rivers, and continual concentration by evaporation. It is said that all lakes that have no outlet are salt. If this idea is correct, and if three-fourths of the water that falls on a continent never reaches the ocean, but after soaking through the soil in various conditions, finds its way to the surface, and is evaporated again, leaving its inorganic salts, then the full power of this force will be seen, and I shall be justified in enumerating the rivers as one of the compensating influences.

If a wagon load of sand be thrown upon a portion of dry ground and left there for a day or two, on removing it, the ground will be found moist under it. It is well known that a field in good tilth suffers less from drouth, and that the best practical remedy for lack of rain, is in deep culture. There is a kind of soakage thus continually going on from below upward in loose soils. That loosening of the soil that favors this is in northern climates effected by the winter frosts. Water expands in freezing one-ninth, and consequently for every nine inches that the frost extends, the surface of the earth is heaved up one inch, and uniformly rendered porous. This favors upward transudation, and is perhaps one reason why northern soils "come in" again better than southern ones, by the lapse of time. It seems to have been granted to them in consideration of a deficiency of solar influences. When we reflect that every grain of the ashes of plants was once dissolved in water and presented in that condition to the roots—that the vital forces of the plant could have had no influence in effecting that solution, these considerations are seen to be of much importance. Experiments made within a year seem to indicate that it is good practice to turn water enough upon meadows to thoroughly wet them for the purpose of effecting this kind of subsoil culture by frost.

Of that portion of water that does eventually reach the sea, much might be retained by arrangements for irrigation. Those rills that run directly down the hills might be taken out along their sides in water furrows, with a descent of the half of one degree. I have had occasion to prove that meadows dressed in this way are vastly benefited, and some facts seem to indicate

that many other crops would be also. Water should never stand in or on any land; but the more it oozes through it and evaporates from it, the richer it leaves it in inorganic salts. Irrigation is the counterpart of deep under-draining, and is worth as much now as ever it was in the day of Egypt, or Nineveh, or Babylon.

The rain that falls in regions near the sea is slightly impregnated with inorganic salts. Panira says "Rain water contains air, carbonic acid salts, and organic matters." On the authority of Liebig, it contains ammonia. What there is of these matters is favorable to an increase in the saline constituents of the soil.

It is a fact that different portions of the ocean differ in saltness, and yet I am not aware that within the period of recorded observation there has been any appreciable progressive increase in the quantity of these saline constituents. If such an increase were to be established, it would be interesting to connect with it the idea that geology seems to inculcate—that all the land has been once submerged, and that nature resorts to this method of renovating worn out and leached out continents.

In addition to these resources, there are beds of marl, of plaster of paris, and of limestone, to which the ingenuity of man may resort. There are deposits of muck in the eddies of the streams, and it is rumored that extensive beds of lime phosphates have lately been discovered. Nor would I, sir, by any means depreciate the use of inorganic manures—the superphosphate of lime, bone dust, or any other. I mean only to oppose, and that strenuously, that premature generalization of the principles of Liebig, that leads to an entire dependence on that class of manures.

An acre of poor land, a clayey loam, after being plowed deep and sown to oats, was top-dressed with ten two-horse loads of leached ashes. The crop of oats did not amount to twenty bushels. It laid over the next season to meadow, and brought a little more than an average crop of clover. The third season an average crop of grass, mostly timothy, was plowed under the 20th of June, and sowed to buckwheat. This crop grew so large and was sown so close, that it lodged, and was trod down and plowed under with a furrow one foot deep by measurement. The next

spring it was plowed again and planted to corn, which is said to be a very good crop. It was only after this land had received a green crop as manure that it showed any marked improvement. The expense of these operations was, at the time, computed at $15.

There is no improvement made in any green crop for manuring purposes by passing it through any process of eating it and digesting it by animals. On the contrary there is a waste by just so much as the animals have derived from it. This must be equally true of all composting processes or any other process which in any measure destroys the tissue of plants.

If the corn ground, which is annually manured and planted, in this State, were divided into two equal parts, and while one of them received all the manure, and was planted, the other was sown with some green crop, and which should be plowed in, there would be no increase of labor, and on the very first year an increase of the corn crop, to say nothing of the fallow half of the field.

Leaves from the forest are peculiarly rich in organic constituents. They make excellent bedding for cattle and horses, and are a resource convenient to almost every portion of the State.

It is very easy to say to the great State of New-York, "buy manure," but with the exception of the importations of guano, the manure that she buys must have come out of her own fields. It is very easy, sir, in the vicinity of this city, with an unlimited supply of manures, and a convenient and steady market, to make processes not only pay, but become really remunerative, that would prove ruinous in the dairying and grazing districts.

And finally, sir, the ultimate reply to all these speculations is to be found in the fact that the average worth of improved lands in the United States is only $10 per acre, and the average price of unimproved lands in this State is hardly as much, while the first crop generally pays for the clearing. In the Western States these items are even less, and this it is that gives rise to the steady tide of westward emigration. It is in vain, sir, to attempt to

confine Americans to any one portion of the earth for the sake of improving it, and we must wait for a rise in the value of land to remedy an evil which, if it exists at all, is confined to very limited portions of the State, and is caused by the abundant supply of new land.

Solon Robinson—I rise to controvert a few of the monstrous propositions of the last speaker—that the American farmer must raise grain to feed European paupers, by which his soil must be wasted, while he must sit down and see it run away, because he cannot afford to buy manures to keep it in good condition. He tells us that wealth is surplus produce, which a farmer may send abroad, and yet only a minute before he told that his neighbors last spring had a surplus of potatoes which they could not sell for ten cents a bushel, *because they could not ship them to England.* If there had been a manufacturing village in their midst there would have been no surplus, no potatoes selling for ten cents. He said, "If a man is so unfortunate as to be a farmer"—Yes, it is unfortunate to be such a farmer as only lives to feed European paupers, or raise potatoes that he cannot sell at ten cents a bushel, or a farmer that cannot afford to buy manure. There is no farmer that cannot double his money if judiciously expended in some concentrated fertilizer for his exhausted soil, whether it is lime, plaster, phosphate, guano, potash, nitrate of soda or common salt, whichever his land wants. I will not allow this abominable doctrine to go out uncontradicted as the sentiment of this club, that a man must sit down contented to see his land go to waste, by the natural course of events which must follow the free trade doctrine.

As to these census report figures proving anything but that the whole thing is a lie, they do not. Who believes that the sheep of this State decreased 25 per cent in five years? What became of them? Did we eat them up? We did eat 13,000 last week, but that would not reduce the number at the rate of 25 per cent, and if it did, who believes that the product of wool increased. If that is a fact, let us reduce the number another quarter, or else do like the Irishman who was recommended to buy a stove to save half the fuel, buy two and save the whole.

It is this "can't afford it" doctrine that hangs like an incubus about the necks of American farmers, and hinders all improvement, and makes us work like willing slaves, though very foolish ones, to raise a surplus of such produce as we can send to Europe to sustain the doctrine of free trade.

Geo. E. Waring, Jr., of Rye, N. Y.—Mr. Chairman, it seems to me that the gentleman has been reasoning on false principles. I do not intend to say that we are not now producing more *in the aggregate* than we ever have done before, but sir, I *do say*, without fear of contradiction, that in very many parts of the country the land is becoming yearly less capable of producing as large crops per acre as our improved implements indicate that they should do, while those fields which yield abundant crops are not, except in rare cases, compensated for their loss of inorganic matter, and that they are on the rapid road to impoverishment. This, sir, may be readily seen from a casual glance of the laws which govern the fertility of the soil and the growth of plants. Dr. Waterbury might bring every census report ever published, and hold them up in evidence of his correctness, and he would find the *facts* of nature's science still unwilling to bow before them. No, sir. The gentleman is wrong in his opinion. The law that *something taken from something leaves less than was present at first*, is immutable, and our experience as farmers has shown, and ever will show, that we are pursuing a wrong course.

But I do not propose to illustrate farther the injurious tendency of our present system of cultivation. That was so fully discussed at our last meeting, and its certainty so clearly settled that we need give it no more time. Our attention may be now more profitably directed toward the *means for improving our operations and preventing the loss which we have seen to be so serious.*

We must prevent further wastes, and make use of all available refuse matter in increasing the fertility of the soil. The effectual accomplishment of this object will be difficult to attain. It will require the assistance of government and a thorough reformation in nearly every branch of husbandry. Every farmer should keep with his farm a sort of custom-house account, in which should be

carefully registered his imports and exports. If he sells a hundred bushels of grain he should ascertain how many pounds of each kind of inorganic matter are thus removed; this he may learn from printed tables which are within his reach. He may pursue the same course with the milk and other animal and vegetable products sold. In some cases strict accuracy will be hardly possible; in such the estimate should be too great, rather than too small. At his yearly settlement of accounts this stock in trade sold should be charged to the cash receipts, at its actual value, and an equivalent amout of the same kind of matter should be purchased and applied to the soil.

True economy requires this, and no farmer, after having once pursued such a practice, will abandon it. I speak now only of the mineral parts of plants, those which constitute the *ash* left after burning. The organic portions are not so strictly due to the soil, as they may be obtained from the atmosphere, and other available sources, while the ashy parts can be obtained only from the soil, and must be artificially returned after their removal.

In preparing the soil for one crop or rotation, return to it an equivalent for every mineral ingredient removed in the preceding crop or rotation. This rule should be ever before the mind of the farmer. By following it he may fully maintain the character of his soil; and it will be necessary to apply, besides this, only ammoniacal manures. If the soil is to be improved, it may be necessary to increase its amount of mineral matter. This can be done judiciously only after the soil has been analyzed.

Those materials which are removed in crops, but which are not sold in vegetable and animal products, find their way to the manure heap, where they must be protected from loss. Hundreds of barn yards in this State have carefully constructed gutters to carry their liquids to the nearest stream or swamp, and thus, while they sap the riches of the farm, they show to the world the profligacy of our economical and practical farmers. I think, sir, that badly arranged barn yards are the greatest sources of loss with which our country is cursed.

Another serious difficulty with which we have to contend is the one mentioned by Mr. Robinson at our last meeting, viz: washing by rains. This can be prevented in most cases, as Mr. R. says, by level plowing, and always by underdraining, which will cause the water of rains to filter through the soil instead of running over the surface, and carrying in mechanical suspension the finer parts of the soil.

While we recommend these improvements to the farmer, Mr. Chairman, we must not forget that the same laws which affect him as an individual exert their influence over communities, towns, counties, States, and whole countries. The internal government of each of these must, in order to secure economy, exercise the same care over the constituents of the soil as is required of the former. The general government affords no true protection to the interests of the country, until it keeps at its ports a strict watch of the goings out and comings in of materials which may affect fertility. Not only are the elements of our soil exported in the shape of grain, &c., but vessels every week load with bones at our seaports and towns, and carry them to England, where they are used as manure. The great republic "strains at a gnat and swallows a camel." It very justly derives revenue from duties on foreign goods, while it very foolishly lets many times its revenue slip through its fingers, in exported produce and wastes, which its proper protection would avoid. The loss of valuable fertilizing materials is carried on so imperceptibly that it escapes our attention. The sewers, gutters and vaults of New-York city alone daily receive animal and vegetable refuse, worth, as manure, over $12,000, being over $4,000,000 per annum wasted by a single city. This is at the moderate calculation of two cents per day for each person, without allowing anything for horses and other animals. Nine-tenths of this waste could, and should be prevented. Were I to make a strictly correct calculation of the wastes of the whole country, I fear that I should be considered a candidate for the lunatic asylum.

What we must have, sir, is such protection from the national and State governments as will enable us to stop this hole in the

nation's pocket. The government is the voice of a majority of the people, and before we can hope for national improvement we must arouse the people to a full appreciation of the importance of our agricultural interests. We must educate them in the fundamental principles which govern our national success.

I speak now, not for the farmer alone, but for the whole people. Agriculture, underlying as it does every other branch of industry, and being the main support of every man in America (whether he realizes it or not), must in its success or failure carry with it all other trades and professions. Had I the time I might prove this by statistics, but every man may learn from the census of 1850 that my assertions are correct.

I am aware, sir, that in cities and towns, where political forces mainly originate, the idea of governmental protection to agriculture is treated with scorn. The well-dressed retailer of ribbons and laces looks with complacency on the Custom House statements of the immense value of those imported, and feels that in selling them he is helping to swell the revenue of the country—but he would ridicule the idea of expending a portion of that revenue in arresting our unfarmer-like wastes, even though that would double our wealth. His calling, when honorably pursued, is one which does him credit, but it should not so engross his attention as to prevent a proper appreciation of the art which enables his customers to pay for his merchandise.

I have been requested, sir, to refer to the means of restoring to our lands the properties which they have lost. The most direct and available of these is, of course, the purchase of guano, phosphate of lime, bones, and all other refuse matters. To arrest the sewerage of all cities and towns, and apply it to the soil, and to import from other countries as much of the mineral constituents of food as we have sent to them, are duties which will sooner or later be performed. There are natural processes by which the soil has its fertilizing parts developed, but if this is continually removed, it must be returned, or the soil will eventually become worthless.

Those matters which go into the sea, however, are not irrevocably lost. Those who were present at this club two years ago, when Prof. Mapes explained some of the means by which these are returned, will need but a few remarks to recall that explanation, and with your indulgence I will briefly state some of the more important points.

All soluble or movable constituents of the earth's surface are liable to displacement by the action of rains, wastages, &c., and may be carried to the ocean by means of rivers. So great is this apparent waste that it is said that a sufficient quantity of fertilizing matter passes the city of New-Orleans in twenty-four hours to fertilize a county. In the economy of nature this is restored to the requirements of vegetation in many and different ways.

Marine plants contain large quantities of inorganic matter, and these are often used as a manure, while the employment of their ashes in the manufacture of kelp, soda, and iodine is a means of their being restored to the soil.

Many fish, such as shad, herring, mackerel, &c., live near the mouths of large rivers, where the foreign matter is so largely present as to afford them support, and they yearly migrate to the upper parts of the river, where they find water sufficiently pure for the development of their ova. These fish are caught in large numbers, and thus reach the soil, while their ova are eaten by amphibious animals, and through their assistance become valuable to man. All fish caught and used as food return to the soil matters which had been carried to the sea in the water of rivers.

Shells are another source of return; so are birds that live on fish, such as birds that frequent the guano islands. Sea foam and spray are sometimes carried by the winds to a distance of sixty miles from the shore, and at this distance leaves have been found with salt on them, it having been carried there in spray and crystalized on the evaporation of the water.

The evaporation of sea water may be another means of return. Cold sea-water may absorb twice its bulk of chlorine, and when

it is deposited in warm locations it gives it up. The putrefaction of sea weeds and marine animals is a fertile source of ammonia and carbonic acid. The deposit of sediment where water becomes still, continues often until the surface rises above the water's level. The Newark meadows, containing many thousands of acres, were formed partly by matters from the Hudson and the ocean, and partly by the wash of the adjacent country. Old ship planks, spars, &c., collect many of the impurities of the water; for instance, wood floating at sea aggregates large quantities of phosphorous.

The large manufacture of sea salt, the formation of coral rocks which gradually form islands, and even large parts of continents (the southern part of Florida, being a coral formation), the use of sea sand for mechanical and domestic purposes, and the formation of marine rocks by the crystalization of the impurities of sea water, are sources which return to the soil an incalculable amount of its former constituents, while the upheavings of the ocean, forming the islands of the tropics, are a wholesome means of restoring inorganic matter to the service of man. These islands, in their various agricultural productions, repay us in a slow manner for the losses which we suffer to continue.

These causes are probably not sufficient to restore *all* matters washed from the soil, but they do so in a considerable degree, and prevent the deterioration from being so rapid as it otherwise would be.

I have mentioned these facts in the economy of nature, Mr. Chairman, that it may be recollected that we have much to assist us in renovating our worn out lands. By following these easy suggestions of scientific investigation, we shall find many sources from which to obtain the material required, and no farmer need, on plea of ignorance, to excuse himself from performing his duty to his own interests in this respect—no nation need quietly see her life-blood oozing away at every point, without at least feeling that she could prevent it if she chose to make the effort.

Prof. Mapes—The English journals are filled with accounts of experiments in the treatment of town sewerage, so as to render it available for the use of the farmer; and the chemists seem to dispute the ability of peat charcoal to absorb the ammonia and other volatile gases of this sewerage. The only difficulty, evidently, consists in the mechanical arrangement of the tanks, filters, &c. It must be evident to all that in so large a cistern as would be used practically for such a purpose, the filtration of millions of gallons, rapidly supplied, and rapidly parted with, cannot be conducted practically by downward filtration, without causing holes or openings through which portions of the fluid will pass, without coming in contact homogeneously with the particles of peat charcoal, but rather continue to pass through a few particles already saturated in the corners of the cistern, or in such positions as contain holes through the mass.

By downward filtration the finer portions must coat the top of the substances through which the fluid is passing, so as to render it impermeable for a continued filtration. All this may be remedied by upward filtration.

Suppose a tank with a false bottom filled with holes, and in this tank, above the false bottom, the material for deodorizing, through which the fluids intended to be passed shall be placed; the fluid should be received in a secound cistern, as tall as the first, but communicating with the first between the false and real bottom. As soon as this lower place is filled, the more fluid portions only will continue to rise through the deodorizing material in their effort to find their level, and thus may be permitted to run away from the top by such an arrangement. All the thicker portions will settle between these bottoms, and may be taken out by a side valve at any time. The filter will never become stopped, because any particles rising against the bottom of the filter will fall from it in preference to being crowded in between the particles of the deodorizing material. This effort of water to find its level always renders its surface level while rising, and hence every particle of the deodorizing material will be called on to act equally. This may be taken out when surcharged, by back

valves or doors around the sides of the cistern, and new material thrown in at the top, and this process may be repeated whenever, by experiment, a portion of the top strata will be found to refuse the absorption of new quantities of ammonia.

We are satisfied by experiment that charcoal dust, or even salt meadow muck, decomposed by the use of salt and lime mixture, has the power of readily absorbing all fertilizing materials, of organic origin, to be found in fluids, if the conditions accompanying its filtration be such as we have suggested. When decomposed muck is used, we find most of the alkalies are abstracted from their solutions, and held by this organic matter. We have tried it with the brown liquor of the barn yard, urine, spent lye, and a variety of other substances.

The sewerage of Edinburgh is found to contain in 10,000 gallons, 11 lbs. of ammonia, 4 lbs. of potash, and 8½ lbs. of phosphoric acid, having a value of about $2, and it will readily be seen that the immense amount of this sewerage produced by a large city, would furnish a quantity of fertilizing material, fully warranting a very large outlay for the necessary arrangements for its abstraction, in addition to which many cities that are bounded by small rivers would be rendered more healthy. Cities like Boston, Albany, and many others occupying elevated positions, with adjacent lowlands, are so conditioned as to render this filtration of the sewerage perfectly easy, and the approach for the removal of the solid materials from the tanks such as to require no handling until received in the carts or wagons of the farmer.

We offer the above remarks as suggestions for the use of those who are inclined to propose plans for deodorizing sewerage.

The practice of upward filtration we have faithfully tried for other processes, such as the abstraction of color from brown syrups by filtration through bone charcoal. We know practically that the process is more complete and even when so conducted.

Judge Van Wyck, after some remarks on the subject, proposed as the subject for the next meeting "The weevil, that evil of our wheat."

Mr. Robinson desired the question, "Advantages of Agricultural Education," to be continued, and the weevil added. They were adopted by the club.

Mr. Robinson moved that a committee of three be appointed to examine and report relative to the value of a new agricultural work by Mr. Waring. Carried.

The Chairman appointed Messrs. Solon Robinson, Prof. Hooper and Henry Meigs.

The Club then adjourned to the regular day, Tuesday, the 1st of August next, at noon.

H. MEIGS, *Secretary.*

August 1st, 1854.

Present—Professor James J. Mapes, Dr. Enderlin, Solon Robinson, Judge Scoville, Judge Van Wyck, George B. Rapelye, Dr. Enderlin, late associate of Liebig, Mr. Stacy, Dr. Waterbury, Mr. Low, Mr. Vail, Mr. Van Boskerck, Robert Lovett, Geo. Dunn, John W. Chambers, of New Ark, and others—twenty-three members.

Mr. Rapelye in the chair. Henry Meigs, Secretary.

The Secretary read a note from Mr. Samuel Jas. Pooley, of Bound Brook, Jersey, with some insects found injuring the potato. They are the same striped wing covers sent to the Club in 1853, by Hon. Richard Bacon, of Connecticut, which were found in vast numbers in some potato fields, devouring the vines, but soon disappeared.

Joshua L. Pell laid on the table, strawberries from California (in spirits), which were six inches in circumference when picked from the vines.

Solon Robinson, Henry Meigs, and John Hooper, who were appointed at the last meeting of the Club to examine "Waring's Elements of Agriculture," lately published by Appletons, made a report in favor of the book, stating that no school should be without it.

The report was unanimously adopted by the Club.

Judge Meigs read from the report of Mr. Flint, Secretary of Massachusetts Agricultural Society, upon the pitch-pine, which states that this tree flourishes best in soil worn out for purposes of agriculture. Pines can be raised from seeds, or by transplanting. They should be planted upon poor land. Take care not to bruise the root in transplanting; that is the great trouble in moving all pines. With care they may be safely transplanted any month of the year.

PINE TREES.

The report of Secretary Flint gives a very valuable instruction as to the culture of our invaluable pine trees.

Pitch pine wants sandy land, or land worn out by bad farming. Gather the cones of these trees in October, before frost has opened their bracts which contain the seeds; keep these dry, or dry them artificially. When they are dry, the bracts open and the pine seeds drop out, or you can thresh them out. Clean the seed by rubbing and winnowing; sow these seed pretty thickly in beds. When they are three years old, you may set them out at almost any season of the year, and they will succeed if you carefully save the bark of their roots from bruises; it is safer to cut off the roots than to bruise the bark of the roots. A thousand white pines were so carefully transplanted that only one or two were lost, by a farmer in Bristol county.

The seed may be sown either in autumn or early in spring. Some, to save the labor of transplanting from beds, plough furrows six feet apart, and drop the seed two feet apart in the furrows. A machine has been invented and used for planting the seed, it costs from $3.50 to $5.00. About a quart of seed is allowed to four acres.

If you plant pine seed on rich land, weeds will hurt and perhaps destroy them. Many thousand acres of poor and wornout lands exist in the eastern part of Massachusetts, suitable for planting pines, pitch-pines have already been planted extensively with success. Profits of farming are not over one, two, or at the utmost three per cent.

[Translated by H. Meigs.]

PARISIAN HORTICULTURE DEPRESSED.

[Revue Horticole, May, 1854.]

We are in the constant habit of visiting all the principal gardens of our capital, and we are deeply impressed with the increasing depreciation of them. The greater number of them are untenable, so badly have they fallen off from their former good condition. Everything in them is changed since their formation. Some of those formed in places where formerly was little population, are now invaded by new buildings, overwhelmed by a deluge of houses. Places become populous in one day. Gardens in similar locations, threatened by buildings, advance heavily in rent.

Twenty-sixth Exhibition of the Imperial Society of Horticulture.

The old Central Society, which has taken the name of Imperial, seems to be unfortunate in its exhibitions lately. Six months ago, in consequence of its having wished to do things in too grand a style, it met with a half check. But at this time it has been still more unfortunate. For want of a sufficient number of competitors on the part of the horticulturist; hardly one half of the space reserved for their contributions was occupied. Those who had the management of this exhibition struggled the best they could on this melancholy occasion. In order to cover up vacancies they stretched out the articles so as to cover with the verdure of plants places where flowers ought to have been. Vain, but laudable efforts! The public was pained and the *Pessimists* (lovers of the worst) predicted the *decline of Parisian gardening!* There were beautiful things there—admirable rhododendrons and azaleas absolutely unrivalled. Those rhododendrons of Hima-

laya, especially the Rhododendrons Edgeworthii—a dwarf shrub crowned with white flowers, larger and more lovely than our largest lilies—and which promise to the hybridizers a vast field for experiments, and probably successful ones. Among the flowers we noticed fine Salvia Splendens, and Diervilla roses.

[Revue Horticole, Paris, June, 1854.]

Mr. Godron, Dean of the Faculty of Science at Besancons, has carefully examined the theory of Mr. Fabre as to the transformation of Ægilops Ovata into wheat. It is a hybrid between common wheat and it; so that we must now reunite it to the genus Triticum—that is really true wheat after all. We are about to experiment the artificial fecundation of the Ægilops with wheat.

According to Mr. Godron, who has industriously sought for specimens of this Ægilops, and discovered that it is *peculiarly fond of the immediate vicinity of wheat fields.*

COTTON SEED OIL.

Capt. Wm. De Peyster laid upon the table specimens of soap and oil from cotton seed, manufactured by a new patent process at New Orleans. Oil from cotton seed is not new, though we believe nearly all the attempts to extract it in this country have proved unsuccessful. The seed of cotton is more than twice the weight of the lint; it is about the size and somewhat like sunflower seed, and equally rich in oil. It is either wasted or used for manure on the plantations, except an inconsiderable quantity fed to cattle. It is poor food, except when cooked with other stuff for hogs. The last *Journal of Agriculture* of the Highland Society, Scotland, publishes a long report upon feeding cattle with cotton seed and cotton seed oil cake, which proved the latter, fed with turnips equally valuable as linseed oil or bean meal. One of the faults of beef made from oil cake is, that it has a taste like tallow candles. Cattle are more fond of cotton seed oil cake than that of flax seed, and it is decidedly better food than raw cotton seed, for they are not good. The cooking and extraction of the oil leaves the residue better than the whole seed, which are too oily, for the digestive organs of the stomach of the ox.

One of the difficulties heretofore experienced in the manufacture of oil from cotton seed arises from the lint that adheres to all Upland cotton seed. That of the Sea Island variety is smooth, but in far less quantity than the other, and it is also more used and more valuable for manure.

Capt. De Peyster thinks cotton seed may be freighted from the South to this city, and the oil manufactured here profitably, because the cake would be valuable for cattle in this vicinity. The above report urges the same thing for British farmers. It states that 55,076 tons of linseed cake, rape cake, and poppy cake were imported into that country in 1852, and 118,213 tons of flaxseed the same year, and that cattle feed might be much cheapened by a supply of cotton seed oil cake. The product of oil from cotton seed, one account states, is five quarts from one hundred pounds of seed. Another account says, a gallon of nine pounds from four hundred weight of seed. The soap made from the oil, stearine, and oleine of cotton seed, is said to be equal to any other vegetable oil for many purposes. It is a subject of vast importance to the cotton growing states, but it will be found that they have another important subject to consider if they send off the seed as well as lint from their soil, they will find it impoverished still more rapidly than at present. It will be very easy, however, to prevent exhaustion, and still sell the seed, if planters will appropriate only ten per cent of sales to the purchase of fertilizers.

FEEDING OIL TO HORNED CATTLE.

A member present who is notorious for his old fogyism, undertook to argue in favor of mixing cheap fish oil with the food of cattle feeding for beef, and thought that some successful experiments had been made in England, feeding cod-liver oil.

Solon Robinson—That must be beneficial to the *consumption* of beef.

Dr. Waterbury said he had known the weight of a patient increased a pound a week by the use of cod-liver oil.

Professor Mapes—No doubt of it; because the human stomach and that of a hog, can digest such fatty matter, as we see in the Esquimaux, who eat train oil; but for an ox to be fed such stuff, shows how little the feeder knows about his own business. The small amount of oil in oil cake, like that almost dry substance, (the cotton seed oil cake,) upon the table, injures the health of the ox very soon without being mixed with other food very largely, to act as a divisor, and it is simply ridiculous to talk of feeding cattle with oil, and I only rise to refute such nonsense, for fear it might go forth as a sentiment of this club. Fatty matter, such as chandlers' greaves, may be fed to swine, and so may treacle, or the cheap residuum of the sugar house, be fed to cattle or hogs in limited quantity, mixed with other food, but it would not be healthy to give it clear, notwithstanding they would grow fat, like the negroes in sugar-making time, but a continued use of such food, without grain or roots, would injure the animal's health. So necessary is it that all rich food should be largely diluted, that we cannot feed grain alone; and the ruta baga turnip, so very valuable for cattle, is ninety-three parts water. All the nutritive matter is in the other seven parts.

Solon Robinson—Some years ago, the British government tried the experiment of feeding cavalry horses in the West Indies with sugar, because it was cheaper than anything else, and because it fatted the animals at first very fast, and so they continued it, and finally found it did not hurt them any, it only killed them, that's all. It would be just as reasonable for a farmer to fat pork to feed his horse as to think of making beef of it.

THE BENEFITS OF AN AGRICULTURAL EDUCATION.

The subject of the day was now taken up.

Professor Mapes—By what means can agricultural truths be disseminated? All agree that agricultural education is at the lowest ebb, and that some means should be devised for its improvement; but how? Agricultural colleges have distinctly failed; the experiment is fairly abandoned by practical men; and while they admit their usefulness for the preparation of teachers, all know that but few of those educated in these colleges become

farmers. Even for the preparation of teachers their use is doubted, and many, if not all, prefer those who have pursued agriculture practically, and who, in addition, have received such an education as includes a knowledge of the adjunct sciences. The pure chemist and the pure farmers are alike unqualified for such duties, while the few who may be found in every community, who, from peculiarities of tastes, have rendered themselves masters, to a sufficient degree, of all the sciences connected with agriculture, and have applied them practically, are, at least, able to meet the requirements of teachers, and to suit themselves to the current events of the community. Among such, then, we must look for teachers, and their services must be availed of in every way practicable. Such men should be employed to lecture in agricultural districts—such men should write books on the elements of agriculture for the use of common schools, and thus render scientific agriculture as part of the common school education.

We are far from objecting to the usefulness of colleges for general education, but their benefits cannot be made to reach the great mass of farmers; the remedy must be applied where it will meet with a wider dissemination. As an example, the use of the Bible and other modes of religious instruction in common schools has, at least, rendered the whole community capable of understanding the different religious sentiments of the day, to an extent much greater than the general knowledge on political economy and many other subjects not so treated, and still the time occupied in religious instructions in common schools is not great. Suppose that agriculture should be taught in the same way, and that a small portion of every boy's time should be devoted to such study, would not the truths of agriculture, like those of religion, become the common property of all? Would not books be written of an elementary character, on chemistry as applied to agriculture, on geology as applied to agriculture, and, indeed, on all the sciences as applied to agriculture? Why not permit the small amount of chemistry, natural philosophy and natural history, usually taught in common schools, to be so arranged as to teach them in their connection with agriculture, and thus, by useful anecdote and application, fasten the facts they contain on

the memory of the student? Will a mechanic or farmer ever forget a chemical fact connected with his pursuit? and will not the college student who studies chemistry *unapplied*, forget almost his whole course by middle life? Indeed, it is undoubtedly true, that a small amount of chemical or any other knowledge acquired in youth in a practical or applied manner, will be remembered through life, while a more general course will be forgotten.

Dr. Waterbury wished Prof. Mapes to speak upon the subject of animal fat.

The Professor said he had heretofore said pretty much all he knew on that subject—that he referred to those opinions—was not recovered from illness, and had already exerted himself too much.

Mr. Robinson—As to our subject, "the advantages of agricultural education," it appears to me the subject may as well now go to the jury. Oil to cattle? Feed a horse with pork! Can a cow get milk out of it? We have never heard so many facts as from Prof. Mapes. His instructions can go to children. The ox shall eat grass and grain, and grind them and convert them into fat and meat. The British once tried (in the West Indies) to feed their horses with sugar; the creatures did very well on it with one exception only—*they all died!*

What a comment we have to-day on the question of agricultural education. Here we have a stripling (Mr. Waring) pupil of Prof. Mapes, with his manual of practical and scientific agriculture—a little pocket volume that any one can read and understand—combining libraries with the practice. A better book than has ever before been written on that great subject.

Judge Van Wyck made several observations on the subject of agricultural colleges, expressing doubts of any utility equal to the experiment of such system.

Prof. Mapes was satisfied that such colleges were failures in the great purpose of turning out the right sort of scholars. Experience them. He would glory in the universal adoption of a truly

practicable system. And he said that this government had been begged from Washington to this day, for such a system to be formed as should embrace the whole country with its powerful arms, and he felt it proper to say, that before long the farmers of this country would thunder at the doors of the Capitol, and demand with irresistible power, that share of the public treasure for the farming interest so long withheld. Why, sir, do they know (no, they do not), that if by force of universal instruction, our soil should be ploughed and well tilled only one inch deeper than it now is, the added product of one year would make the gold of California for the same year, turn pale because of its littleness. My neighbor, Mr. Berckmans, near Plainfield, in New Jersey, is scientifically and practically using his large means for the benefit of the great cause. He has followed the experiments of the justly celebrated Van Mons, in the fruit line. He has now for distribution, eleven hundred good, and some very fine pears, and forty thousand seedlings, on the Van Mons plan. He gives away his trees.

Mr. Meigs said that the French government became quite stimulated by the success of Von Thaer, and a few others, to go into the founding of agricultural colleges. She sent an able man, Royer (a few years ago), to examine the German colleges, &c. His report forms an octavo volume, published by the government On examination, he reports against the system. Von Thaer's great school was sustained by *Von Thaer alone*; his personal qualities eminently enabled him to maintain a small school. When he died, the spirit of the Mœglin school fled also. No Von Thaer is any where else found in any national institution. I entirely coincide with Prof. Mapes, whose views are fully before the public. Every farmer in the land should, to the proper extent, become a scholar; the teaching must be plain, practical, and all the science of it become household words on every farm.

Subject for next meeting—"Top dressing grass and grain crops."

The Club then adjourned to Tuesday, August 15th, at noon.

H. MEIGS, *Secretary*.

August 15, 1854.

Present—Prof. Mapes, Hon. Hugh Maxwell, Messrs. Lawton, Lowe, Chambers, Rapelye, Van Wyck, Prof. Renwick, Martin E. Thompson, Messrs. Barney, Schenck, of Jersey, Blakeslee, of Connecticut, Cowing, of New-Orleans, Rev. Dr. Fitch, lately of California, John Robinson, John Lodge, of Jersey, Mr. Judd, Consul Cowdin, Paul Stillman, Mr. Pardee and Mr. Henry, of the Mechanics' Institute, and others—between forty and fifty members.

George B. Rapelye, of New-York, in the chair.

Henry Meigs, Secretary.

The Secretary read the following extracts made by him, viz:

THE BEE EATER.

Aristotle describes it in the 40th chapter of the 9th book of his History of Animals. In the 1st chapter of the 6th book and thirteenth chapter of the 9th book he calls it Merops. Linnæus called it Merops apiaster. It catches bees on the wing as swallows do flies.

Natural History of New-York—Zoology, vol. 2, page 117.

GENUS TYRANNUS, OR TYRANT RACE.

Our king bird is Tyrannus intrepidus—the intrepid tyrant (portrait 72). He is called in New-York *King bird*, elsewhere commonly called *Field martin*. He winters in Mexico, enters Louisiana on his way north about the middle of March, and enters New-York about the last of April or beginning of May, and he goes as far as latitude 57 degrees north. He spreads over our continent from the Atlantic to the Pacific. It lays from four to six eggs, white, with a few deep brown spots; feeds on berries and seeds, beetles, canker worms, and all kinds of insects. By this, and his inveterate hostility to rapacious birds, he more than compensates for the few domestic bees with which he varies his repast. Like hawks and owls, he ejects from his mouth, in the shape of large pellets, all the indigestible parts of insects and berries.

The olive sided king bird (figure 73), Tyranus Cooperi, is nearly of the same size and appearance and habits; it directs its

main stream of migration from Mexico along the shores of the Pacific Ocean. It has been seen here and in New Jersey—doubtless breeds here.

The Secretary called the attention of the club to a peculiarity in the tomato. Here are a ripe peach and a ripe tomato, and the blades of two penknives. One has been covered for two hours with the juice of the tomato, and is not in the least corroded. The other, covered with the juice of the ripe peach, was corroded by it in a few minutes. The juices of all fruits, roots and plants, corrode steel and iron rapidly. The venerable French physician from St. Domingo, who first taught my father and me, in 1795, to eat the tomato—then despised as the unwholesome love apple, disgusting both in smell and taste—said that it did not, like other vegetable matter, turn sour on the stomach, and that it produced the same salutary effect on the liver that calomel does, without any of the evils incident to the use of calomel.

Henry Cowing, Esq., late of New-Orleans, spoke of his patent agricultural inventions, and exhibited drawings of a portable steam-engine for farm purposes—one of the peculiarities of which is the driving wheels, fourteen feet in diameter, by which he thinks it will enable him to cultivate crops, as the body of the machine is so high it does not interfere with growing corn, or cotton, or sugar cane, until it is over six feet high. The machine is also calculated for applying to the purpose of locomotion on common roads, or for city fire engines; but his grand object is to furnish a steam locomotive engine for plowing, harvesting, threshing, and ordinary farm work. He also exhibited drawings of gang plows, to be worked by steam, for cultivating crops three rows at a time. Also, a gang that will turn the earth four inches at a time, to any depth, according to the number of plows in the gang—making a furrow two feet deep at one operation. Of course this kind of machinery can only be operated in large fields, such as may be made upon the great Western prairies. Mr. Cowing talked as familiarly of plowing two feet deep as most farmers do of two inches. He also exhibited a plan of a machine for a

rotary digger, somewhat upon the principle of the one invented by Gibbs, which was exhibited last spring upon the farm of Prof. Mapes. He also exhibited a new plan of boiling sugar, by giving more fire surface to his pans, without the least danger of burning the sugar, as in the present mode of boiling in open kettles, set directly over the furnace. His plan is to place his fire in a furnace surrounded with fresh cane juice, and by dampers shut off the fire before striking the charge from the pans. The plan seems to be a cheap, economical one, and great saver of fuel.

Another plan of a new machine was for digging ditches, either by steam or horse power, which is different from its predecessors for the same purpose, inasmuch as it digs only a part of the depth at once, and deepens it by passing back and forth.

LAWTON'S IMPROVED BLACKBERRIES.

Mr. William Lawton, of New-Rochelle, exhibited some fine specimens of the new blackberry of that place, which were eaten with much gusto by the members; and a bush loaded with fruit, in its various stages, was admired as surpassing anything in the blackberry line ever seen by most of those present. It contained 600 berries. The cultivation of this kind of fruit in gardens is something new in horticulture. Mr. Lawton stated that all the valuable qualities of the original plant are continued in his propagation. His plan is to top off about one-third of the shoots, which increases the size of the berries. Those which grow in the shade are more perfect than those grown in the sun. This variety affords more shade than any other known. The vines continue bearing, in favorable seasons, two months. The three-year-old roots are the most fruitful. They bear a few the first season, plentifully the second year, and very full the third year. He planted last year 2,000 plants, that will produce two to four quarts to the stalk this year. Shoots from old roots will average a gallon of berries. Single stems produce from 800 to 1,000 berries, some of which are nearly an inch in diameter. Thirteen of the berries weighed two ounces. This is not the common high blackberry—cultivation does not improve that. This is a new variety—they never ripen small—the seeds are covered in the

pulp, quite unlike the common blackberry. Their shape is more like the dewberry or low running blackberry.

They will continue in bearing all through August and till the middle of September. The demand for these berries is greater than can be supplied at 37½ cents a quart, from about an acre and a half of Mr. Lawton's vines, and all that are raised by others. They are just now in full bearing. This new blackberry is an accidental seedling, discovered a few years ago at New-Rochelle, about twenty miles out of New-York, on the New-Haven railroad. Its remarkable appearance induced Mr. Lawton to take pains to cultivate and propagate the plants. In addition to his own, he has sold a good many roots, so that it is likely soon to become pretty generally diffused. Mr. Lawton says that his grow upon a rather moist rich piece of ground, and the berries acquire the largest size under the apple trees. [This may be, but their flavor is not as good, we are satisfied, as when grown in the sun.]

The propagation is by off-shoots, each root producing several, and only one or two retained for bearers next season. All the old wood must be cut away, as the same shoot never fruits but once. In setting a plantation of these berries, Mr. Lawton recommends that the rows should be twelve feet apart.

Judge Van Wyck proposed the following resolution on the occasion, which was unanimously adopted:

Resolved, That the Farmers' Club of the American Institute highly approve of the efforts made by William Lawton, Esq., of New-Rochelle, to cultivate, improve, and spread, that most valuable blackberry spoken of to-day; and that he has presented to this Club at different periods, both this season and the last, most liberal specimens of this blackberry, so that every member (and they sometimes number nearly fifty) could not only gratify his sight, but his palate, with eating as many as he pleased, and thus be qualified to judge, in every stage and season of their growth, their superior qualities as regards size, flavor, and succulency, and also their constant improvement each year under his management; and that we do hereby earnestly and decidedly recommend

the Lawton blackberry (as the Club has correctly named it) to public notice and patronage.

Prof. Mapes remarked that if suitable manures are used the land could not be made too rich for the growth of these berries. They will not grow on poor land. One of the shoots exhibited, it will be seen, has grown ten or twelve feet long this year. We should be very glad to see this and many other choice varieties of fruit more extensively cultivated. There is no doubt of the healthiness of all ripe fruit, and none is perhaps more so than blackberries.

TOP DRESSING OF GRASS AND GRAIN.

Upon the regular subject of the day Prof. Mapes made the following remarks:

The importance of this subject, Mr. Chairman, must be my excuse if prolix in my remarks, but when we remember that the crops which are to be improved by top-dressing are annually greater in value than the entire banking capital of the Union, added to the value of all the precious metals, it may plead my excuse for prolixity. Indeed, in my belief, the advantages to be derived from the judicious top-dressing of these crops will be more than equal to any one of the crops now grown, and would be very much greater than the value of the cotton crop. The value of the live stock of the United States, at this date, is not less than $600,000,000, and this will be increased by any increase of the grass and grain crops. More than 120,000,000 bushels of wheat are annually grown, 14,000,000 bushels of rye, 150,000,000 bushels of oats, 5,000,000 bushels of barley, 9,000,000 bushels of buckwheat, 320,000,000 lbs. of butter, 105,000,000 lbs. of cheese, 14,000,000 tuns of hay, and these, it will be remembered, are in addition to the crops of Indian corn, potatoes, and many other crops produced, nearly equaling them in value.

The effects derived from some kinds of top-dressing now in common use among our farmers are observed, but the cause of their action is not clearly understood. Thus the top-dressing with stable manure is supposed to be of material value from the

manurial property of the material thus thrown on the surface of the ground. This is not true, the beneficial effect simply arises from the action of this litter as a mulch, and might be produced by much cheaper means. It will be remembered that the organic portions of the manures thus placed are wasted during their decomposition, while the inorganic portions alone find their way into the soil, and these might be supplied at one-tenth the cost of the cartage and handling of the manures so used. At least 90 per cent of the true value of such top dressings as manure is wasted when so used. The same, or nearly the same results would be attained by covering the ground with any other mulch. This practice is well known among English farmers, where it receives the name of *Gurneyism*, from the name of the operator who first applied it. We are far from disputing the value of a mulch as such, but such valuable constituents as exist in the more decomposable portions of stable manure should not be wasted, while adding a very small portion of the inorganic constituents to the soil. A coating of leaves from the woods, salt-marsh hay, sedge, or any other substances, which would protect the surface of the ground from sudden changes of atmosphere, and prevent its freezing at so early a date in the fall, or losing its moisture and heat by the too direct contact of winds, would answer all the purposes to be derived from a top-dressing of stable manure. All will recollect that if a board cover the grass during winter, and be removed in early spring, that the growth of the grass on the part so covered during the following summer will be much greater than in any other parts of the field. Therefore, whatever top-dressing may be used, mulching may still be appealed to by those farmers who have cheap materials to use for such purposes. All this, however, is but incidental to the true subject of top-dressing. The use of top-dressing may be thus stated: young plants are unable to avail of the inorganic matter of the subsoil during the early stages of their growth. The surface soil may have become denuded of these inorganic constituents, and without their presence and appropriation by the young plant, its organism may not be sufficiently perfect, at an early stage, to secure a healthy growth. In addition to this fact, the organic matter in the soil ceases late in the season to decompose for want of sensible heat, and in early

spring, from this cause, the supply of organic pabulum may be insufficient, hence the necessity of top-dressings, containing both inorganic materials in a soluble form, and organic stimulants to secure their appropriation From the position they occupy on the surface, passing down in solution, they come in contact with young roots, which otherwise could not reach their proper food, for if placed beneath these roots, except so far as they could be reached during the process of evaporation, the pabulum would be beyond their reach; whereas, when placed at or near the surface, the humidity of the soil places these top-dressings slowly in solution, pervading its whole surface, and gradually sinking so as to meet these roots, and be absorbed by them during their downward passage. During the fall and early winter, while growth is sluggish, and sufficient increase is insured to enable the young plants to withstand the action of the winter, and after the process of growth ceases, their roots become a receptacle, acting as a store house until required for spring use.

Top dressings in the spring stimulate the plants to an earlier growth than would be attainable during the low temperature of the first spring month. Indeed, the action of top-dressings is to make the slight amount of soil occupied by young plants the representative for a time of the whole depth of soil which the perfect plant will afterward pervade, and in the choice of top dressings strict reference should be had both to the requirements of the soil and of the plants. Thus, a soil deficient of potash, or soluble phosphates, cannot raise full crops of wheat or grass. When short of sulphuric acid and lime, the clover crop cannot fully succeed; and thus with each crop, its leading requirements, if absent from the soil, should be added, and with these such stimulants as will cause their appropriation by the growing plants. The amount of stimulants used for spring top dressing may and should be much greater than for fall use. When two ingredients are required by the soil, which are antagonistic to each other, such as potash and ammonia, then they should be separately applied; suffering the ammonia to sink into the soil before the application of the alkali, so that if the acid with which the ammonia has previously been rendered non-volatile, should be abstracted from the

soil by the use of the alkali, that it may do so at a sufficient depth, to insure the absorption of the freed ammonia by the supernatant portions of soil. Thus guano should never be applied to the soil as a top dressing until it has first been mixed with some divisor containing sulphuric acid, which is capable of changing the carbonate of ammonia of the guano into the sulphate of ammonia, and if to the same soil potash or any other alkali be applied, its application should be withheld until a few days after the application of the guano, and after the dews and rains, and natural humidities of the soil shall have conveyed it beneath the immediate surface. The alkali during its after descent will become a carbonate before it comes in contact with the sulphate of ammonia, and will be so divided as to reach it in a dilute state, acting itself as a manure by supplying alkali to the plants, and insuring the decomposition of many of the constituents of the soil for the use of the plants, before its final use of decomposing the ground, and rendering it in a fit state of food for the crop. All our crops have been analyzed, and the analysis published; therefore, any farmer may readily know, by an analysis of his soil, what are the requirements of his crop. The most usual deficiency of soils for these crops will be found to be soluble phosphates, potash, chlorine, soda, lime, and nitrogenous matter in some safe and soluble form. All these may be readily obtained. Unleached ashes will supply potash. Common salt, which is composed of chlorine and soda, by previous decomposition with caustic lime will furnish these ingredients, while bones dissolved in sulphuric acid, and incorporated with Peruvian guano and sulphate of ammonia, as in the *improved super-phosphate of lime*, will insure the presence of all these materials. When the soluble silicates are deficient in soils they may be supplied by alkalies which will act on the silica of the soil, or by the waste ley of the soap boiler, which contains it in solution. In the use of these or other top dressings they should be divided by admixture with a large amount of soil or other material, such as charcoal dust, decomposed swamp muck, or other divisor may be used.

or fall top dressings the nitrogenous portions may be less than those used in the spring, and after top dressing a slight mulch of leaves from the woods, or other cheap and decomposable material,

may be applied with advantage, nor will this mulch interfere with the introduction of spring top dressings; for by that time the drying of this mulch, as well as its partial decomposition will permit dews and rains to percolate the mulch so readily that it will afterward act as a protector to prevent the loss of the ammoniacal portions from the direct action of the sun and air. I have at this time more than one hundred letters from individuals who have top-dressed their grass and grain crops with the soluble phosphates, and who have increased their quantities to many times the cost of these manures by such application, while the portions left resident in the soil by their permanent improvement are entirely equal in value to their cost.

Solon Robinson—Mr. Chairman, Professor Mapes has alluded to the value of live stock in this country, and consequently the enormous value of the crops necessary to support so many animals. The numbers given seem very large, but, sir, if you will glance at the number of domestic animals that we consume in this city you will think that there are a good many of them growing somewhere. Why, sir, the receipts of last week were 25,840; that is, 545 beef cattle, 1,253 calves, 2,217 swine, and 16,955 sheep and lambs. Estimating the bullocks at an average of 6 cwt., the receipts of last week alone in this city will make 3,249,000 pounds of beef. Estimating these beeves at $54 a head, or 9 cents a pound for the beef in the quarters, and it makes the snug little sum of $294,410 for one week's supply of beef. The sheep and lambs will average $3.50 per head, making $59,342. The swine and calves will average $6, making $20,820; and making a total of $374,572 for the animals received for slaughter in this city last week.

WEEVIL IN WHEAT.

Mr. J. Payne Low made the following observations upon this subject:—In consequence of the ravages of the grain weevil, or wheat weevil, the importance of this subject cannot be doubted for a moment. If the agriculturist should be willing to receive all possible aid from the sciences generally, and chemistry particularly, in order to learn how maximum crops may be grown, it is certainly of as much importance that he should use every

means to protect them from the ravages of insects, which very often leave but a scanty allowance to remunerate him for his toil, although insects perform a very useful office by assisting in keeping the vegetable kingdom in subjection; yet how frequently do they materially lessen the profits of the agriculturist? It therefore becomes evident that it is a part of the profession of the cultivator of the soil to learn as much as possible of the nature and habits of insects, so that he may thus be the better enabled to discover the means of preventing their injuries. The wheat plant, from the moment that its seed germinates until the grain is received into the granary, is subject to their ruinous attack. But the evil does not rest here, for the little depredator, chosen for consideration to-day, as well as others, is likely to give evidence of its destructive powers in the granary It is a usual expression that "bread is the staff of life," and notwithstanding the fact that in the United States alone upwards of 120,000,000 bushels of wheat are grown annually, yet it would be very interesting and important to learn how far this "staff of life" will last if some means be not discovered to prevent pestilent depredators from gnawing it in pieces. Although the agricultural press teems with statements of the immense destruction of insects upon the wheat crop, yet, as the grain weevil is the subject chosen for to-day, it would be a digression to treat of others. The grain weevil, or wheat weevil, known to the naturalists as the *curculio gromarius* of Linnæus resembles very much in appearance the rice weevil (*curculio oryzæ* of Linnæus), which is also known to attack wheat, but upon close examination they can readily be distinguished from each other, the rice weevil being smaller, and having two redish spots upon each of the wing covers or wing cases. The wheat weevil exists in four states, namely, the ovum, or egg, larva or grub, pupa or chrysalis, and imago or perfect insect. It is slender in form, of a pitchy red color, about one-eighth of an inch long, and is furnished with a snout bent slightly downward. The thorax is long and coarsely punctured. The wing cases, which do not entirely cover the abdomen, are striated. The female deposits her eggs upon housed wheat, which, after a short time, become hatched, each grub occupying a single grain, and it frequently leaves the hull only behind. These grubs soon pass into

the pupa state, and eventually come forth perfect beetles. From the time of these perfect beetles pairing until their progeny shall have undergone the last metamorphosis is usually about fifty days. It has been stated that in a single season one pair of these insects was known to produce upward of 6,000 individuals. The ravages of these pestilent depredators are not always visible at first sight, but if a handful of wheat partly devoured by them be thrown upon water, the injured grains will float upon the surface. Notwithstanding the innumerable remedies that have been tried to prevent their evils, very few have proved useful. Killing these insects by heat is rendered impracticable, because the temperature required to cause their death would injure the grain, and, therefore, the cure would seem to be as injurious as the disease. There is a French remedy, of which much has been said, namely: the spreading of unscoured fleeces of wool over the wheat, which will attract the insects to their surfaces, and cause them to die, but from what cause is not well understood. The frequent turning over of the heap has been found useful in many instances, as the insects dislike to be disturbed, and endeavor to seek more quiet hiding places, which they can readily do if the granaries be old; but this plan, to prove effectual, would involve much labor. The best preventive seems to be the salting of wheat. I learned from a friend of mine, a short time since, who has tried this method of preservation for several years, that he has never had his salted wheat attacked by the weevil. He generally mixes about one pound of salt with two bushels of wheat. He also states, that this salting prevents, in a great degree, the necessity of sunning wheat, which would be a great saving of labor. This is a very simple preventive, which could be very easily tried, and should it prove to be universally successful, would be of incalculable value to wheat growers.

Solon Robinson—The insect that has destroyed so much wheat in Western New-York and Pennsylvania and Northern Ohio this season, which is called the "red weevil," is not the one spoken of by Mr. Low. That destroys the wheat and Indian corn, particularly in the Southern States, to a distressing degree in the crib or grainery, while the other attacks the wheat head in bloom, and

utterly annihilates every grain before it is perfected. This is called the wheat-midge in England. It is the most terrible pest ever encountered by wheat growers. There is no guarding against its attacks.

The subject for the next meeting, to be held September 5, will be "The proper manner of ploughing and winter managing clay soils."

H. MEIGS, *Secretary.*

September 5, 1854.

Present Prof. Mapes, Messrs. James G. Lawkins, of Sidney, Australia, Solon Robinson, Moss, of Westchester, Dr. Waterbury, Geo. Bacon, Stacey, Merrick, Geo. E. Waring, James Waring, Van Wyck, Vail, Elihu Smith, of Albany, Paul Stillman, and others—nearly forty in all.

George E. Waring in the chair.

Mr. Waring desires the club to acept an amendment to his recent treatise on agriculture—"The Elements of Agriculture." At page 175 I there say that the average production of the Genesee valley is but 12½ bushels of wheat per acre. I am credibly informed by Hon. B. P. Johnson, of the New-York State Agricultural Society, that the average crop of that locality is 19½ bushels, and Professor Mapes says that the crop of the whole State averages 12½ bushels per acre. Begging publicity to this correction.

James G. Sawkins, of Sidney, Australia, being requested to speak of the agriculture and of that region, said:

I am no farmer, consequently I wish what I say to be received simply as the observations of a traveller—*not an express man*, the velocity of whose transit prevents his seeing any object with exactness, *or the sailor*, whose limits of information are generally confined to the harbor he has visited. When I say "traveller," I mean the man who can go leisurely over ten or fifteen miles a day, examining with care and delight the beauties of creation—stop where he finds attraction, whether in the geological forma-

tion of the country, its mineral, botanical or chemical mysteries; he examines them, and notes down for the benefit of his fellow men anything useful to them.

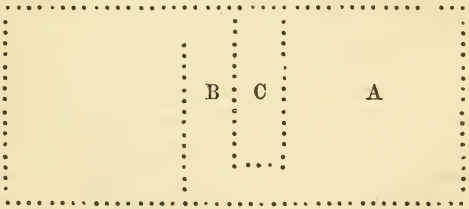
Now, with regard to the colony of New South Wales, which constitutes the southeastern portion of Australia, I rode over, in the manner I have above described, some two thousand miles in seven months, spending some days with the most hospitable and intelligent set of men, the "squatters of the unsettled districts," from whom I learnt the following particulars:

The government of New South Wales, in order to open up the lands on the western and northern frontiers, adopted a system of renting them at the low price of 10s. per square mile, for grazing sheep and cattle, granting a pre-emption right for a certain number of years to the bold pioneer who dared to expose his life and property to the treacherous and plundering attacks of the aborigines. (The most degenerate of the human species, blacker than the African negro, and much worse formed; lazy, superstitious, and incapable of communicating with those who live but a few miles apart from them. Each tribe seems to have a different language, and are continually at war with each other. Their corrobberies are extraordinary exhibitions. Some boys have been sent to England and educated, but, like the American Indian, he returns to his tribe as soon as he has a chance.) They are generally gentlemen or noblemen's sons in the northern districts, who came out with sufficient capital to start 5,000 sheep on their "runs," as soon as they took them up on the frontier, frequently beyond that point known to us. His sheep increase at the rate of 90 or 95 per cent annually. He continues to extend his pre-emption right over lands, and before the period of fourteen years (the terms of his lease) comes round, at a yearly rent of 10s. per square mile, he has become rich by the increase of his stock, &c., and sells a portion to those who come after him, and penetrates further on the frontier. In this manner the "squatter" soon becomes independent, and retires home to England to enjoy his former society.

The sheep are usually washed in large water holes, remaining in the bed of rivers, but when they can get running water it is considered a great advantage. All the wool is sent, washed, in bales to market.

In regard to cattle, there is a remarkable peculiarity. On the "sheep runs" cattle do not like to graze, and sheep depreciate if put on cattle runs. As cattle in the northern districts are only valuable for feeding the household, their hides and tallow, they are taken to the "boiling down establishments," near some port, during the winter season, where they are reduced to tallow and exported.

The system of branding cattle among those who devoted themselves entirely to the fattening runs, I consider, on a much better system than that I saw in Mexico, South America, and California, instead of lassoing and throwing the creature down previous to applying the branding iron, in the following simple manner:— Two "stock yards" are erected of strong post and rails, the cattle are run from A to D (as in the following diagram), being detained in their passage by the entrance of D being closed, until the avenue B is filled with cattle. Men are stationed within the enclosure C, with branding irons, and the necessary apparatus for heating them; and while the cattle are so enclosed the brand is applied. It is to be observed this avenue must be very narrow to prevent the animal, when once in, from turning or using his horns. A whole herd may be thus branded in the course of a forenoon.



Agriculture in New South Wales is very backward. The Australian Agricultural Committee, until they rented their mineral land, could not sell their shares but at a discount. On the valley

of the Hunter and the arable country generally, for 150 miles around Sydney, may be said to be under cultivation, profitably even at this time when labor is particularly scarce and expensive. Wheat, in many cases yields 30 bushels to the acre. The finest and most productive is that produced in the Southern province of Australia, "Vandiemans Land" or "Tasmania."

The geological formation of New South Wales is similar to that of the United States as it regards the coal measures; but the oscillations and volcanic forces approach much nearer the eastern coast. The existence of active volcanic action at Mount Wingen, on the coast between Sydney and Newcastle, and at Smoky Cape, are evidences of existing causes for future elevations and eruptions of the land extending eastward. We hear from the aborigines that volcanos exist to the northwest of great size, but we have no other evidence as the country has not yet been explored. These volcanic fires on the coast originate in the immense beds of coal with which New South Wales abounds. I observe, by a late paper, some extraordinary geological movement has taken place since I left the colonies.

One of the most remarkable features of the country is, that the rivers run inland, and on the eastern coast there are none but "bar" rivers, of very insignificant character. Their extraordinary tendency to run westward was most striking to me. 50 or 60 miles north of Brisbane or Moreton Bay a deep stream rises about twelve miles from the ocean, in a ravine at the west side of one of the "glass houses" (name of the five mountains in this region) runs round it to the southeast, when it suddenly turns to the westward, makes its way through a range of mountains into the Stanley river, and then into the Brisbane, coursing over more than a hundred miles inland, at the same time the land between the spot where it rises and the ocean appears perfectly level. Those rivers west of the "coast range" all tend to the westward. Whether the whole of their waters find their way to the sea, down the "Murray" to the western coast, or empties themselves into the Great Desert, no white man has ever ascertained.

FLAX MACHINE.

Prof. Mapes said that 50,000 tons of flax straw is wasted in Ohio, where it is grown and threshed for seed. A. H. Carryl has invented a machine which does not cost over $200, by which he can make 500 lbs. of lint per ton, worth $140. The Fall River Flax Company can use up all that is grown. There is great demand for these machines for making lint of tangled flax straw. It would be invaluable to the paper makers.

IMPROVING POTATOES.

Dr. Waterbury—I had the blossoms from an acre of potatoes pinched off. It greatly increased the yield and quality, and prevented the rot.

PLOWING CLAY SOILS.

Prof. Mapes made the following exceedingly interesting remarks: Although clayey soils are more retentive of manures than any other, from the power of alumina to retain ammonia, and not, as is sometimes supposed, from the impervious character of clay in passing water freely, still these soils, from their peculiarity of texture, present difficulties for general use, and in the fall plowing it should be performed in such a manner as to correct the mechanical faults of such soils; nor will the rendering of clayey soil more pulverulent at all interfere with its power to retain ammoniacal vapors; on the contrary, in an ameliorated clayey soil these vapors can pass between a greater number of particles, and hence come in contact with a greater amount of their surface for absorption. Clayey lands should be ridged and back furrowed in the fall, so that the surface may represent a succession of letter A's with a letter V intervening between them. Through these furrows, represented by the letter V, the subsoil plow should be deeply run; and if the lifting subsoil plow should be used, it will have nearly the effect of underdrains. Before the ridging and back furrowing, manure may be placed on the surface, and thus doubling the surface soil in ridges from the two directions will cause the manure to be encased within these ridges. The frequent freezings and thawings during the winter will disintegrate the portions represented by the letter A, render-

ing them pulverulent by spring, while the consequent admission of atmosphere will produce all the conditions of the decay of the manure so encased; that portion which assumes the gaseous form will be absorbed and retained by the ridged soil, while those portions which are rendered soluble will pass into the V shaped furrows, and be received and retained by the soil which has been rendered purverulent by the use of the lifting subsoil plow. A soil so treated may in early spring be again rendered level, and ready for immediate culture, by passing a two-way plow through the centre of these ridges, throwing them in the two directions into the furrows. The cross surface plowing should then follow to bury the manure exposed from these ridges, and to render the whole surface of the soil homogeneous. If before the cross plowing, and after the use of the two-way plow, the lifting subsoil plow be repeated to a full depth in the track of the two-way plow, it will render the depth of disintegration between the parts represented by the ridges and by the furrow alike. A clayey soil so treated will in the following summer work as kindly as one of a more loamy character. When charcoal dust (old charcoal hearths), or even swamp muck can be procured, it may be laid in the fall in these furrows between the ridges; the effect of winter will complete its disintegration, while it will act on the soil beneath it as a mulch, and in the spring plowing its division through the soil, by the splitting of the ridges and the cross plowing, will prevent the aggregation in after years of clayey soils, and thus prove a permanent corrective. Clayey soils are often rich with the inorganic elements of plants, and they often contain vegetable matter that has not been fully acted on by the atmosphere from the peculiar tenacity of the surrounding particles, and, therefore, the treatment we have recommended is highly calculated to present conditions necessary for these amendments. When clayey soils are properly amended, they are more valuable than any other, from the fact that they not only retain manures most pertinaciously, but are less likely to be acted on by sudden changes of temperature. When such soils are already ameliorated by this process of ridging and back furrowing, the plowing of future seasons should be such as will leave the surface roughened, thus exposing a greater amount of surface during winter; for, while it is highly

judicious to roll a sandy soil to prevent its being rendered blowy by spring, it is equally necessary to secure opposite conditions for a clayey soil. Clayey soils are also advantaged by fall and winter mulching more than any other; for, while mulching prevents the compacting of the immediate surface by winter rains, it also freely admits the passage of the atmosphere in the fall and spring, heavily laden with the gases of the decompositions of these seasons, which are received and retained by clayey soils better than by any other. The general manuring of clayey lands should be performed in the fall or late summer, and if practicable with long manures; for in such soils there is no fear of losing the results from the decomposition of the manure in the atmosphere. The rising gases will be all retained, and the decay of the ligneous portions of the manure will not only supply carbon for the disintegration of the clay, but will, also, by their disappearance, leave spaces for the circulation of the atmosphere, and thus assist in rendering the soil more pulverulent. When sand can be procured it may be added to the surface of clayey soils before ridging and back furrowing, and before the broadcast spreading of the manure, as the manipulations which necessarily follow in these operations will secure its more intimate admixture by spring, while it will leave the inner surface of the ridges in a proper condition for the atmosphere to assist in the decomposition of the manure. The spring splitting of these ridges will finish the distribution and admixture of the sand with the clay, and the cross-plowing, if appealed to, will render this admixture the more perfect. The adding of sand to clay is well known to be a good practice, and therefore those who prepare composts for clayey soils should freely use in the composts sand or other divisor, giving greater value to the manure, and rendering it more peculiarly adapted for use in their soils.

H. C. Vail—We should laugh at a carpenter who undertook to build a house with a saw and hammer. It would be no more unreasonable for him to do so than it is for the farmer to try to do all his work with one kind of plow, or to grow all sorts of crops with one kind of manure. The advantage of plowing clay land in the fall is very great.

Mr. Moss, of South Norwalk, Conn., exhibited his artificial cow. It is, however, only an imitation of the bag with teats of gutta percha, so natural as to be readily taken by a calf who sucks from it; hay tea, farina, or any suitable food, being made fluid, like milk. It is suspended so that the calf finds it at the natural height. Mr. Moss finds that this is far better than for the calf to take it from any vessel—his head down. Mr. Moss has calves brought up by this teat as healthy growing and (as he says) as suck-sessfully as in the good old way. By this means a great saving is made of butter and milk, and the calves are well fed to a proper age instead of being sent to market—*a shocking bad food —slippery veal* of a few days old; or any number can be reared to full aged cattle. Mr. Moss denies that this is a Yankee contrivance, for he is a Pennsylvanian.

Mr. Solon Robinson begged leave to offer an amendment, viz., that the artificial bag be duly attached to a figure resembling a cow, covered with a veritable cow hide.

Mr. Moss was thankful for the amendment, but denied its necessity. Sir, you should see with what eager vigor my calves suck at my artificial cow; sir, it is as good as any cow, and better, for it stands still and never kicks the calf or the pail over, maid and all!

Mr. Robinson did not press his amendment, but he adverted to the huge mass of two-day old veal hurried into this market. What a sacrifice unfit for food, and vast herds of future cattle thus permanently annihilated. Sixteen hundred such calves, and more outsiders, are sold in this market before they are one week old. We hardly know what veal is, and always should be careful.

Elihu Smith, of Albany—William Brush, a farmer, at Greenwich, in Connecticut, now has a veal of the right sort. The calf is nearly six months old, is six feet long from horn to rump. Her girth is four feet eleven inches, and her weight is *six hundred pounds*—a heifer—dark red color, a half bred Devon and native.

Judge Van Wyck adverted to the new yam extensively grown in China, as worthy of our attention, possibly as a substitute for potatoes.

Dr. Waterbury remarked that there was a modification of the "shortening in" process, which he had practised on potatoes with very good effect. The plant has not blossomed much for the last few years because it has been too feeble. It has two ways of reproduction, by buds on the tuber, and by means of the balls, and, like other plants, spends its vigor in maturing its seed. Of these two methods of reproduction, only one of them gives products of any economical use, and this process (by the tuber) may be encouraged by the abrogation of the other (by the seed). In 1852 the incipient buds were nipped at the times of hoeing on an acre of potatoes, and these potatoes in the fall were larger and more "mealy" than those of a half acre near them, although the latter were on the best land. The tops on the acre did not die as early by two or three weeks as those of the half acre, although they were planted at the same time. Nature indicates this method of treatment, for this plant reproduces itself most naturally by the seed in warm climates, while it does so by its tubers in cold regions. In Southern latitudes the tubers are worthless as articles of food; and when the plant is raised from the seed in our latitude it takes it some years to acclimate itself and change its habits of reproduction. This operation is no specific for the rot as the plucking process suggested by Dr. Klottsh, of Prussia, and recommended by Dr. Gregory, of Edinburgh, in 1850, was supposed to be. It acts only by conferring strength on the vines, and directing, so to speak, more juices to the tuber, and seems to be analogous to that operation for a large time practiced on animals, by which the development of the individual is secured by the loss of its power of propagation.

Judge Van Wyck renews his proposed subject, "Insects injurious to grain, especially corn and wheat."

Solon Robinson prefers the question, "What can be done to avoid such calamities from drought as we now suffer."

Professor Mapes seconded it, and it was unanimously adopted.

Professor Mapes was asked relative to the effects of the drought on his crops. He replied, that owing to his deep and thorough tillage, the deep ploughing and deep subsoiling, his crops do not suffer at all, and he invited a large committee to visit his farm and examine it on Thursday next.

Messrs. Paul Stillman, Cowing, of New Orleans, Moss, of Connecticut, and others, were appointed.

Professor Mapes exhibited Lima beans grown on his experimental farm. The pods were of the best size and growth, and ordinarily *six to eight of them on one stem.* (The usual number is seldom more than half that). The Professor thinks, that instead of letting the vines run as far as they like, the way to have the best crop is to pinch off the ends of the vines, which then become sturdy in their figure, send out strong branches and bear fine fruit. That by proper management the Lima bean vine can be made stout enough to stand without a pole. The product per acre of such a crop would be extremely valuable, not so much for being picked green as being gathered dry for market, in which they are always in much demand and small supplies, at very high prices.

The Club adjourned till September 19, at noon.

H. MEIGS, *Secretary.*

Sept. 19, 1854.

Present—Messrs. Martin, E. Thompson, Hon. Hugh Maxwell, Mr. Crouch of England, Mr. Paul Stillman, Judge Van Wyck, George F. Barney, Dr. Waterbury, Scott, Dr. Church, Waring, Vail, George Bacon, Professor James J. Mapes, Solon Robinson, Lowe, Rapelye, Howe, and others, about fifty members in all.

George B. Rapelye in the chair.

Henry Meigs, Secretary.

The Secretary read the following translations, &c., by himself:

[Annales De La Societe Imperiale D'Horticulture De Paris. July, 1854. Translation of H. Meigs]

HORTICULTURAL VISIT TO THE BARON ROTHSCHILD, AT FERRIERES, BY M. JAMIN.

Messrs. Maufra, Durand and myself, on a recent excursion to Ferrières, had an opportunity to admire, on the superb property of Monsieur le Baron de Rothschild, three great hot houses, or conservatories of glass, grapes nearly ripe; they are forced, such as the several Chasselas, Frankenthal, Boudalés and others. These conservatories are warmed by hot water in what are termed Thermosiphons. (Meigs—This poor Greek word only means *hot pipes*.)

The *oidium* soon showed itself on these vines, but at its first appearance the chief gardener of Baron Rothschild, Mr. Bergmann, powdered the pipes with flour of sulphur, and the oidium soon disappeared before the sulphurous exhalations; and yet no trace of the sulphur remains upon the grapes. By the common methods of using sulphur, the grapes inevitably have a taste of it. Mr. Bergmann has never failed in fine grapes those four years that he has tried his plan.

The evergreens of the Baron are transplantations in a dry season (some of them); all perfectly successful; and that with trees thirty feet high. This shows great skill and care in his plantations.

A FLOWER.

Linnæus, in the genial warmth of his love for flowers, called it *the nuptial bed*, in which the mysterious fecundation operates.

A flower is complete with a *pistil and a stamen*, for these are the indispensable organs of fecundation, producing the seeds which are destined to perpetuate the species.

The most simple and complete flower is the Hippuris. (Note.—Lindley's 277th order, Haloragaceæ or Hippurids.) The Hippuris Palustris.

The Honey cup, *Nectarium* (nectar cup), is polymorphous (of a great variety of shapes).

Stamen is the male, usually of two parts, a filet or thread, and an anther, which is the essential organ, for it contains the fine

dust called pollen, usually of a yellow color. This, when ripe, discharges an elastic fluid mixed with minute grains called fovilla, which is considered to be the fecundating material. The anthers are the same in number always in any one species, and almost always the same in the genera. They vary very much in form. The study of pollen is one of the most curious parts of botany.

Linnæus established two modes of describing species and genera of plants, and true botanists have followed his example.

In 1700 Tournefort gave in his (Institutiones rei Herbariæ) account of dried plants, the names and histories of one hundred and forty botanists who had appeared since Hippocrates, who lived 459 years before our Savior (now 2,313 years ago). We find among them but one who arranged plants rationally. These botanists were almost all doctors, and they studied, more than anything else, the medicinal virtues, real or supposed, of the plants. In the year 1500 Conrad Gesner first instituted the first genera from the peculiar characters of flowers. Other botanists imitated him until Tournefort appeared. Superior to all his predecessors, he put all botany into a crucible, reconstructed the genera, and based them upon studies of the flowers and the fruits. Tournefort was enjoying the glory of being an illustrious botanist, when one day walking in the street, in Paris, he was caught between a cart and the wall, and was crushed to death in the fifty-second year of his age. Linnæus followed him in botanical research and high reputation. His father was a pious pastor at Smolande, a small village of Sweden. He was born May 3d, 1707; died at Upsal, January 10, 1778, in the same year with Rousseau, Haller and Voltaire. Our great botanist, Laurent De Jussieu, published in 1789 his great work, Genera Plantarum Secundum Ordines Naturales disposita (or kinds of plants in their natural order).

The breathing of vegetables by their leaves has caused perplexity among philosophers, but Hales, the English savan, has demonstrated it so clearly by experiment, that with or without reasoning upon it, the fact is put beyond all doubt. When a plant is thirsty it drinks moisture by its leaves from the atmos-

phere; when filled with moisture, and a dry, hot, windy time comes, then the plant breathes out moisture.

Brogniart, in 1826, thus explained the action of pollen before the Academy of Sciences: A grain of pollen is composed of two membranes—an exterior, somewhat thick and not elastic; an interior, more thin and elastic—with extremely minute grains *endowed with motion.* When a grain of pollen falls upon a moist stigma it swells, and holes are formed through the exterior membrane. The interior membrane makes ruptures through these holes, lengthens itself into one or many tubes, which penetrate the tissues of the stigmata, there the style, when at a certain depth the lower extremity of the tube open, the grains of pollen, *having motion,* go out of the tube, continue to descend through the tissues of the style, the ovary and placenta, finally arriving at the ovular sack, into which one or more enter; there they meet with other minute grains with which they incorporate, and thus form the rudiment of the embryo.

Thus the embryo is formed of two materials, one the female embryo, already in the sack, the other the pollenic male, which comes from more or less distance. This mode of fecundation is confirmed by the formation of hybrids.

This view of fecundation is not agreed to except by the masters of the science, and is far from being generally adopted. Many difficulties are brought forward; for instance, how can we conceive of the fecundation of the thousands of seeds in the ovary of tobacco? Can we conceive of thousands of spermatic tubes descending at the same time into a style no larger than a thread, without its diameter being augmented?

[Revue Horticole, Aug., 1854. Paris.]

THE FARM SCHOOL OF THE ORNE

Is situated on the old domain of St. Gautier, about 3½ miles from Domfrout. The road to it is beautiful for its magnificent panoramic views. It is at the extremity of the forest of Andaine; the grounds slope gently to the south, and contain about 240 hectares (about 500 acres). One half in cultivation, the other to be cultivated soon, they are busy with it.

The soil is very variable; lower part of the farm meadow swampy, but is being rendered sweet and wholesome by *energetic drainage*. The upper part has a subsoil of partly decomposed quartz. It is crowned with very vigorous coniferæ of two species. This soil is capital for grain and grass.

There are now thirty scholars under two masters, one agriculture the other horticulture; a steward and a chief director make up the administration of the school. Ten hectares are in garden and the rest farm. One half the garden is used for forced culture. The fruit school has 2,000 fruits of different sorts. It is proposed here to simplify the synonyn of fruits (names), which at present is a *Dedalus*. This school has yielded valuable results; thirty kinds of peaches are specially treated after the methods of Dalbret and of Montreuil, giving them finely proportioned forms and vigor. Liquid manures are used for fertilization, and to *conquer* or *avert* maladies.

The wall for the espalier peaches is of wood, covered with a thick coat of lime mortar of transparent white; it is about 16 feet high, with a projecting cap or roof of nearly three feet. 1,000 square yards and more are covered with pear trees grown in pyramidal forms; they are of very rich, vigorous growth, and fully equal to the peach trees in luxuriance. We admired that wonderful order into which the rebellious trees have all been brought, for instance, the Madeline, the *Cuisse-madame* (lady thigh), Colmar d'Aremberg, the Noisette Lépine, &c.

An extensive place of deposit for all the implements, where a journal is kept of the name of the scholar and the implement which he has in use. We thank Messrs. Louvel, the directors, for their kindness to us visitors. Farmers have already profited by lessons from this school; they visit it in numbers, and examine the processes and results.

PREVENTION OF THE EFFECTS OF DROUTH.

Prof. Mapes—Upon the question of the best manner of preventing the effects of such a drouth as we have lately experienced throughout this country, Prof. M. said: When we find an ab-

sence of moisture from the immediate surface, as in drouth we may, of all soils not properly prepared, we naturally inquire where the water is, and conclude that the moisture is in the atmosphere. All this we readily recognize by noticing the condensation on the cold surfaces. While the ground is thoroughly dry, the north side of a stone wall early in the morning is wet. How are we to cause the soil to represent the cold object? Wherever soils are disintegrated to a sufficient depth, they will be found to be colder than the supernatant atmosphere, and hence, when air circulates in a free soil, it will deposit moisture on every particle of earth colder than itself. It is for this reason that thoroughly underdrained and subsoiled lands never suffer from drouth. Water condensed from an atmosphere through which rain has not passed for a long time, is highly charged with the fertilizing gases. During drouth, the air being more highly charged with ammonia than at other times, plants growing in deeply disintegrated soils, frequently stirred, grow with unabated vigor during a long drouth. That not one plant could be found which had suffered from drouth on my farm is distinctly due to the fact that the whole is underdrained and subsoil plowed, and the surface kept well stirred. All shallow plowed land in my neighborhood and elsewhere, has witnessed a material deterioration in the amount of crops, while in all cases where the subsoil plow has been freely used, the drouth has not injured the products to any observable extent. The same preparation which will secure land against drouth will protect the crops from the ill effects of too much rain.

Mr. H. C. Vail said that Mr. Flood, of Patterson, subsoiled this season a portion of a field, all treated otherwise alike; upon the subsoiled portion the crops were good, while upon the other part they were almost worthless.

Mr. Meigs remarked that the theory of deep tillage relative to drouth, was illustrated by decomposed sand stone. At Nyack, the residence of the Hon. Hugh Maxwell, the free stone quarries contain large amounts of rotten or decomposed stone called kellis, which has proved to be very fertile. Now while this stone remains solid, moisture can hardly penetrate it, and like some hard soils, unfit for cultivation. The decomposed rocks form the

great part of all soil. Good farming is then a thorough decomposition of land, making it easily penetrable to moisture, air, roots, &c.

Mr. Vail.—Mr. Chairman—During the past season, we have had the best chapter on agriculture ever presented for our perusal. The efficacy of thorough preparation of the soil and continuous cul ure of crops as a preventive of ill effects from seasons of drouth, has been fully demonstrated. The question, "how to prevent the effects of a drouth?" has been so ably discussed by Prof. Mapes and others, that I will occupy but a few moments of your time.

We all know that water is an essential element of plant and animal existence, that in the bodies of plants and animals, it not only exists in chemical combination, but that its presence is essential to secure elasticity and lumpness; that in the atmosphere, in the form of vapor, it plays an admirable part in sustaining them, by preventing the too rapid drying of their exposed surfaces. In the soil, water acts as a solvent of the substances required by plants, and plays the part of a vehicle in carrying such elements into their structure. The water thus taken into plants, passes off from their surfaces by evaporation, leaving the substances which were dissolved by it, deposited in various parts. We know, too, that every square foot of soil is parting with moisture during dry weather, and absorbing it during moist or wet seasons. Now it is evident that in a badly prepared soil, during a protracted drouth, the plant and soil must part with more water than they receive; as soon as this occurs, crops suffer to a greater or less extent. We find the continual evaporation of water from the plant, affords it protection from excessive heat, and that in proportion to the increase of heat is the increase of evaporation. We explain the phenomenon in this way: Bodies have a capacity for heat in proportion to their bulk. Now one cubic inch of water can take up a certain amount of heat, but as heat is added, the bulk of water is increased until in a vaporous form it occupies many hundred times its original volume, and of course appropriates many hundred times as much heat as simple

water did. As soon as the plant ceases to receive water from the soil its fluids are dried up, and of course it perishes.

There is no truth so well understood as that which asserts that not an atom of matter is ever lost, but that there is frequent change of *locality* and *form;* and we know that the water which escapes from the plant and soil exists in the atmosphere. This is proved by the exposure of a cold surface to a warm atmosphere, as in the case of the water jar already alluded to, where the surface of the jar, pitcher, glass, stone, &c., becomes covered with beads of dew. In short, we know that water exists in the atmosphere, and our present inquiry is: "How shall we get it back in the soil, where it is most needed?" Do we not all know that the interior surfaces of the walls of a stone house are always damp in summer, from the deposition of water from the atmosphere circulating through it? Imitate this condition in the soil. Introduce the heated air into the soil at such depths that it will deposit its moisture on the colder surfaces of the particles composing it. If thorough underdraining be performed, the current of heated air entering at the lower point of the drain will rise up through the soil, and not only deposit its moisture, but all of the fertilizing gases suspended in it. Deep and subsoil plowing promote this action, and may be thus explained: If you seize a handful of minute glass tubes, insert the lower ends in a vessel of water, and pass a rapid stream of air over their upper ends, the water will be seen to rise rapidly. As soon as the blowing ceases the water recedes, and new portions of air occupy its place. Now, the soil may be viewed as a mass of such tubes, and the more thoroughly and deeply it is stirred, the greater the length and number of tubes, and the more rapid their action. Every breeze which blows over the surface of the earth discharges the air in part from the pores of the soil, allows water to rise up from below, and by such continued changes new quantities of air are introduced, and thus from the two sources water is supplied in sufficient quantity to meet the demands of vegetation.

Soils properly charged with carbon and alumina (charcoal and clay) are more retentive than sandy ones, although it is true that clayey soils bake readily and suffer from drought. During the

past season I have noted the growth of plants on an immense pile of fine charcoal dust, all of which is due to the absorption of water from the atmosphere and its retention by the charcoal.

Many instances have come to my knowledge where the depth of plowing has been increased only a few inches, and the result has been almost a total preventive of the evils resulting from a drought. Subsoiling has, however, taken the lead in this respect. Mr. John O. Flood, of Patterson, N. J., informed me that he was unable to subsoil his land at the time of plowing. I accordingly advised him to run the subsoil plow in the bottom of the furrow in which the corn was to be planted. He did this on a portion of the field, and he now assures me that the corn so treated has not suffered from drought, and that although the field is level, yet the portion subsoiled appeared to stand on higher ground, it was so much taller than the rest. He also states that a strip of land running across the field never bore corn more than three or four feet high, but that this year the portion of it subsoiled equalled the remainder of the field, while the other part bore corn as usual. Potatoes gave the same good results from the same mode of treatment.

Mr. S. B. Halliday, an extensive market gardener, of Providence, R. I., has subsoiled extensively, and the committee of agriculture appointed by the State Agricultural Society, estimated the good effects of this operation for this year only, at *one thousand dollars*—more than enough to pay three times the cost of the operation.

Irrigation, and the use of liquid manures, have been spoken of at large, and the benefits of each are understood by all. In many districts liquid manures cannot be supplied, hence the most highly soluble manures can be used with marked advantage in dry seasons.

In conclusion, we should not forget that the thorough preparation of the soil not only prepares us to encounter the severities of a drouth, but enables us to avoid the evils of a season too wet.

Mr. Waring—Mr. Chairman, the subject under consideration is one of most vital consequence. To know how to escape drouth is to fortify ourselves against the direst scourge with which we have to contend, and every farmer in the country should diligently apply himself to ascertaining the means of protection.

Were a hostile army to sweep over our fertile fields and destroy more than one half of our crops, the whole nation would be roused to resistance. The sturdy yeoman would leave his plow in the furrow and fly to the rescue. The spirit of '76 would be awakened in every breast, and all that American energy could accomplish would be done to overcome the common enemy, while the tide of eloquence at Washington would ride as high as in a former time.

But, sir, what is the case now an enemy *has* entered our fields, destroyed whole harvests of plenty, and will carry our poorer classes to the precincts of famine. Still, no voice is raised calling our armies to the rescue. Our farmers are mourning their blighted hopes, but they are doing nothing for protection. Eloquence is for a time dammed out at Washington, but when in a few months more it shall flow into our capitol, the legislative halls will resound with the roar of its waves, as, with quondam force, they beat against the public coffers, crying as usual for money for the benefit of commerce, and for the acquisition of territory. Nothing indicates that the negligence which has robbed us of about one-half of our crops, will receive a word of censure, nor that the means of preventing a repetition of the calamity will obtain a hearing in the august assemblage.

The press, with its mighty influence, rarely mentions the means of escaping drouth, and still less often does it make this a question for public discussion and action.

I don't suppose, sir, that we shall accomplish much by talking these matters over here in the city, but when the reports of our meetings go abroad throughout the country, in the various papers, we may hope to see that at least a few farmers will take the matter into their consideration and feel disposed to improve their modes of cultivation.

Drouth injures plants in many ways. It deprives them of the water necessary to form the sap and act as a means for carrying food to the various parts. The moisture of the leaf, which is necessary to cause an absorption of carbonic acid from the air, is removed. The cooling of the plant, by the evaporation of water, is not allowed to proceed, and it becomes injured by an excess of heat. The soil becomes so thoroughly dried that there is not moisture enough left to act as a solvent and carry food into roots. The cracking of stiff soils, also, break and otherwise injure the roots. While the constant evaporation of water from the surface of the soil cools it and renders it still more uncongenial to early growth.

This deficiency of water may be supplied by rains, by dew deposited on the surface of the soil, by irrigation, or by thorough subsoil plowing, and under draining where necessary. Over rain and surface dew we can, of course, exercise no control, and for artificial improvement we must look entirely to irrigation and the thorough mechanical disintegration of the subsoil.

Irrigation, or the flooding of land by water, may be adopted on every farm with much success, though in some locations it is more feasible than in others. For instance, where springs are frequent on the summits of hills, the water from the springs may be conducted by channels over their sides, in such a manner as to water every part. On level, or comparatively level lands, irrigation is attended with more expense, but is productive of equally good results. In many instances it will be necessary to conduct water in pipes to reservoirs located in different parts of the field. The great difficulty has hitherto been to procure a sufficient supply of water at a point high enough to distribute it over an entire farm. That difficulty has been finally overcome by the Ellington windmill, which, as far as I have been able to ascertain, may be constructed for about $50, and will pump water enough to irrigate a large amount of land. It is so constructed that it furls its own sails, and is never liable to become disordered by strong winds, so that it runs the slowest when the wind blows the hardest, though it does not carry out the same principle and run the fastest during a calm.

By simple means, irrigation may be applied on any farm, the expense varying with circumstances. The benefits ensuing will always be great. Ninety-nine hundredths of our farmers, however, if they wish to escape the effects of long continued drouth, will find their most economical means to be *subsoil plowing and under-draining*. Many farmers suppose that by opening the soil to the circulation of air they admit a greater amount of heat, and thus dry the earth to a still greater depth, and that under-drains, instead of increasing the amount of water in the soil, will draw it off with greater rapidity. A little reflection, however, suffices to show them that their reasoning is incorrect. Thorough subsoil plowing, accompanied by under-draining on all but very dry lands, will most effectually pulverize the soil to a great depth, and to this thorough disintegration we look for our supply of moisture.

The manner in which this is deposited is very simple. The soil and the air always contain about the same amount of water. In winter the soil contains more than in summer, when a part of its moisture is removed by heat, and exists in the atmosphere as a vapor. On the dryest day this summer the atmosphere has contained more water than on any other day during the season. Being in the form of a vapor, it was of course imperceptible to our observation.

It was held in the vapory form by heat. When this vapor comes in contact with substances colder than itself, it loses its heat, contracts, and becomes liquid water. We often see that a cold pitcher, in summer, becomes covered with moisture by this condensation of the vapor in the atmosphere. Coal cellars are always damp in summer when the air with its watery vapor is allowed to circulate through them.

Now, sir, if the same air circulates through the cooler subsoil, its moisture will be deposited by the same principle of condensation, and in this manner the soil may *always* (in every situation where subsoil plowing and under-draining are possible,) be supplied with moisture in sufficient quantities to answer the purposes of growth.

This principle, sir, needs no further explanation. Long experience has fully established the facts. The severe test of the present season has resulted in another complete triumph of the system, and all that is necessary is that it should become well known to all.

When we have a Department of Agriculture at Washington, sir, (which I believe we shall finally succeed in obtaining,) we may hope to be secure against the ravages of drouth, for then the necessary information may be disseminated in a manner to be accepted by our farmers.

Mr. Maxwell—The law authorizes you in a reasonable use of streams of water running through your land.

Prof. Mapes—It is often asked what is the action of drought on plants. As drought is the absence of water, as cold is the absence of heat, we should first examine of what advantage is water to plants, for on the absence of these advantages depend of course the influence of drought. Water then may be called the lubricator of the plant, swelling its fibres, causing them to be supple. A large majority of the weight of most plants is water. It is a communicating medium for much of the pabulum of the plant. Gases when entering the lower part of the capillary tubes of plants may rise through water, and be appropriated during their passage; but in a plant too dry for the full exercise of its functions, no such appropriation can take place.

Even the outer surface of plants cannot be in a healthy condition without the presence of so much water as will prevent their termini from losing their organism, and ceasing to assist in the further development of the plant. A certain amount of water is required to be evaporated from the surface of plants for the abstraction of the excess of heat; for as all substances render present heat latent by the increase of their bulk, so the water evaporated from the surface of a plant by increasing its bulk 1,700 times, is capable of rendering sensible heat latent, and does so by abstracting the sensible heat from the plant. One's head may be cooled by first wetting and then fanning, and the same facts are con-

tinually occurring both with the plant and the soil in which it grows, for the evaporation of water from the surface of the soil cools the water below the surface to the proper temperature for the use of plants.

Different parts of the organism of the plant are discharging excretia, which can only be carried down through water, while excess of pabulum existing in one part of the plant is by means of water transferred to another part where it is required for appropriation, but the necessity for the presence of water does not end here, for in the atmosphere and in the soil it is the prime motor for the re appropriation of the ultimate results from decaying nature, thus the dews and rains as they fall through the atmosphere wash from it and carry to the soil ammonia, carbonic acid, &c., and with them are received into the roots of plants, where these constituents are appropriated, while the aqueous portion passes through the plant, performing its lubricating offices, and is parted with at the surface for the purposes we have before named.

In the soil the presence of water is not less important. It carries to the soil the heat it receives from the atmosphere, and in its evaporation from the surface of the soil it carries off the excess of this heat, and such other quantities as may be received from the direct action of the sun's rays on the surface of the soil.

From the expansion and contraction of water during freezing and thawing, it exerts a mechanical action in the disintegration of soils, rocks, &c. After such disintegration it carries the constituents rendered soluble by chemical changes, consequent upon the presence of moisture, so as to bring these constituents in contact with others, and thus new chemical actions are engendered, and new compounds formed, such as may be required to prepare inorganic food for plants.

The roots of former crops, by the presence of moisture, are slowly rendered soluble, and their integrants are carried in a state of solution into the roots of the new growing crops. By the presence of this medium, each chemical product is more evenly

divided throughout the soil, so that each root of a plant may meet with a portion of all the soluble constituents resident in its vicinity.

During the various chemical changes in the soil gases are evolved, which would be thrown off into the atmosphere were it not for the property of water to absorb them, and thus detain them for the use of plants.

The motion of water down through the soil must cause a partial vacuum between particles, and thus induce the entrance of atmospheric air laden with various other gases required for vegetation, which are absorbed by the moisture resident on the surfaces of particles of soil, replacing that previously absorbed by crops.

All these facts are readily proved by observing the increased effects produced by the irrigation of meadows; thus we know that watered meadows often produce five crops of grass, where, from ordinary culture, but one crop could be obtained in the season.

Mr. Kennedy of Myermill, England, has sustained 1,000 head of stock on 90 acres of Italian rye grass, by continued watering; and on land capable of sustaining under ordinary circumstances but six sheep to the acre, he has successfully kept 56 by the extreme dilution of small quantities of soluble manures. It should not be forgotten that 100 lbs. of manures in solution in 100,000 gallons of water, will produce a greater amount of vegetable growth, than 500 lbs. of manure in solution, in 1,000 gallons of water, and simply because the greater amount of its dilution brings it in contact with a larger number of the roots of plants.

It is often asserted that highly manured land is less liable to suffer by drought, and as often answered that this arises from the fact that those who manure freely always cultivate deeply, but this is not true of all manures. Those of a saline character do attract moisture from circulating atmosphere, and for this reason we often see cellars that have been wetted with salt brine remain damp for months.

Market gardeners often apply small streams of water between the rows of celery, and keep them continually running, by which

means they more than double the amount of their crops, and this too without any additional manure other than that which would be used in the absence of such arrangement.

So much then for the effects of drought. But can these effects be avoided in ordinary dry seasons? We answer yes; for in well underdrained and deeply disintegrated soils, the deposit of moisture on the cold surfaces of particles from the atmosphere circulating within them, always insures crops against drought. Who ever knew corn to curl, or a meadow to run out, on well underdrained and sub-soiled land? The farmer who properly prepares his soil may defy drought in the growing of ordinary crops, and those requiring large amounts of pabulum in extreme dilution, can be better grown in soil deeply prepared. Such soils too, are more benefited by irrigation than others, because the water, as it passes rapidly through them, deposits its fertilizing powers while it passes off, and is replaced by atmosphere following in its course.

Mr. Robinson proposed as a subject for the next meeting of the Club, "Selling all farm and garden products by the pound."

Paul Stillman—All California does so, and it is the best and fairest method.

Judge Van Wyck renewed his proposal of "Insects injurious to vegetation."

Prof Mapes moved that both subjects be adopted and discussed at an extra meeting, to be held on the 26th, at noon. Adopted.

The Secretary read the following letter from John G. Adams, M. D., relative to Mr. Field's present to the Institute, divided as a scale into ten parts joined, decimetres; and the whole into 100 parts, making it, as it is called in common use, a centimetre. Also two common measures used in the shops, of red tape, marked into 150 decimetres, or one metre and one half. Also an engraved figure of each of the French weights and measures. Also examples of fine wrapping paper, which receives ink writing as well as the best writing paper. Also a sheet of letter paper, with envelope, weighing one-quarter of an ounce, and notwithstanding

its extreme delicacy, it may be written upon with ink upon both sides of a sheet.

George E. Pomeroy, editor of the Detroit Daily Tri-Weekly, and Weekly Tribune, sent, free by express, to this club, a box of plums, asking our opinion of them. He says that they were raised by Mr. Briscoe, of Detroit, "by budding a Bolmar upon a Mediterranean."

Mr. Crouch, of England, was requested to speak as to the Cycloidal Forking Machine, patented by Wilson, &c., of London. He said that trials had been successful on land which had been trodden fifty years, which at the first trial was forked up by this machine in coarse lumps; but upon going over it a second time was made as fine as sand. It was equal to the forking of six acres in a day. The circles, furnished with curved teeth or prongs, could be put on one axle, as many as was deemed convenient for operation. Mr. Crouch had no doubt of its ultimate success in tilling the great majority of soils, any imperfection in it will soon be remedied by ingenious mechanics. Of course its operation in soil having much root or fibre or stone is less perfect.

Mr. Maxwell enquired of Mr. Crouch, whether it was deemed likely to displace the plow?

Mr. Crouch—It will not entirely—for instance in sod.

Mr. Robinson—I know something about stone land. I was born in Connecticut. I saw it once proved, that stones upon the surface protected crops in a drouth. It is now a debatable point, whether clearing land of stones improves its productiveness. Upon the subject under discussion, what we most need is a law in every State to promote irrigation—a general law, to authorise the use of running streams to make corn as well as to grind it. We want that old fogy law abrogated, which was made before the invention of steam engines, and which forbids the owner of a farm to divert a running stream from its channel on his own land, whereby the volume of water may possibly be lessened at some antiquated old grist mill, scarcely worth three fourpence-ha'penny pieces, at some dam below. It is that law that effectually dams all efforts toward a general system of irrigation in this drouth-parched land.

The members tasted the plums and universally declared them to be excellent, and unanimously voted thanks to Mr. Briscoe and Mr. Pomeroy.

The club then adjourned.

H. MEIGS, *Secretary.*

September 26, 1854.

Present—Prof. Mapes, Dr. Bartlett, late of Albion, Messrs. Griffing, of Jersey, Trye, of Long Island, Paul Stillman, Pardee, Amos Gore, of Jersey, Vail, of do., Judge Van Wyck, &c.—22 in all.

Mr. Griffing, of Jersey, in the chair.

Henry Meigs, Secretary.

The Secretary read the following translations and selections made by him:

[Revue Horticole, Paris, June, 1854.]

REMEDY FOR POTATO DISEASE.

M. N. C. Bollman, Professor of the Agricultural Institute of Grizoretki, &c., 1853:

After such numerous fruitless attempts, one certainly is sceptical as to any such discovery. But accident has led to the following experiments, which seem to meet the approbation of Lindley and other Englishmen cultivators.

Bollman, the Russian agriculturist and professor, had invented a machine to plant potatoes. It had a serious fault—it broke off the young shoots from some of the eyes of the potatoes, and even bruised the potatoes also. In 1850 he dried his seed potatoes, that his machine might not damage them as it had done. He put them for three weeks in a hot close room. He planted these, and had as large crops as his neighbors, and *all free from disease*, while his neighbors' crops were all more or less diseased. Mr. Bollman thought that this exemption of his dried potatoes from the rot was probably accidental, as in millions of other cases. In

1852 he tried again, and not having enough to plant of his own potatoes, he bought some which were more or less affected with the rot, and dried them like the rest. He kept them a month in a very warm room. He cut them into quarters and halves, according to their sizes, and then kept them hot for eight days more. The heat was, by inadvertence, raised so high that he thought he had destroyed the vitality of the germs. However, he planted them, and, contrary to his expectation, they all grew rapidly, and so vigorously that he had young potatoes from them *three weeks* sooner than common. Many yielded nine for one, and although the neighboring fields were *all attacked* by the disease, there was not *a single trace of it on any of his, either plants or tuber.*

The result of three years' experiment led Mr. Bollman to enquire after like results among farmers. He found two. One of them, Mr. Losowski, of the canton of Sebége, in the government of Witepsk, had dried his seed potatoes for years past, and had no rot. He learned this by mere accident. Pulling up potato stalks one day, he put one potato into his pocket. When he got home he threw it in a corner near a stove, where it remained till the ensuing spring all wrinkled and perfectly dry. He had the curiosity to plant it, and it grew well and yielded a quantity of fine, perfectly sound potatoes. After this Mr. Losowski dried all his seed potatoes, and always had a perfectly healthy crop.

The second experiment was by Mr. Wasilewski, a land owner in the government of Mohilew. He had stored some potatoes in his smoke house, where he cured his hams, in 1852. Not having enough to plant of his common stock, he planted those from the smokehouse. They produced a crop superior in value, and showed scarcely a trace of the rot, while the others were all diseased.

Prof. Bollman says it is a general practice in Russia to dry artificially several of the seeds reserved for planting, such as hemp, wheat, and rye. That onions which have been long smoked are sought after by farmers, and they call them the *lymka*, that is, *smoked onions.*

The temperature necessary to dry the potatoes sufficiently, is not less than twenty-two degrees Centigrade, (nearly seventy degrees Fahrenheit.) He tried some potatoes in ovens, where the heat was 58 to 60 degrees Centigrade, about 136 degrees Fahrenheit. He even in some cases scorched the skins, and yet the germs were not injured; they produced vigorous plants.

These facts were noticed in the London Gardeners' Chronicle, and called out many correspondents, who claimed the same discovery; but all of them mention a mere drying in open air. Mr. Bollman, after all, is the only one who insists on the high artificial drying. He thinks that rap d drying is far better than slow, and that the drying should be so complete as to make the pulp completely hard and the skin full of wrinkles, *almost beginning to roast the potato.* After being thus prepared, the sooner they are planted the better.

Mr. Lindley says that potatoes when made very dry, not only escape the rot, but grow with unusual vigor. To what may we attribute this singular result? Probably, says Mr. Lindley, to this circumstance: The insoluble starch of the potato is by a high temperature converted into gum.

Braun has discovered zinc in a species of violet pensé, in Rhenish Prussia, in a region of zinc, (zinciferous.)

London Farmer's Magazine, Sept. 1854.

Potato rot severe in Ireland and England.—Paper--much inquiry for substitutes for rags.

From 1830 to 1834, average amount of paper made before the reduction of the duty from three pence to one and one-half pence per pound, seventy millions pounds per annum. From 1849 to 1853, one hundred and seventy-seven millions.

This increase of paper required more than sixteen thousand tons additional of materials. If it was all from flax fibre, it would take 64,000 acres of land to produce it, and our additional flax spinners take 83,000 acres. Our flax spinners had 50,000 tons per annum from Russia, of which they now get about half by circuitous channels, so that we suffer a deficiency of flax that would take 100,000 acres to produce.

Inquiry is made everywhere for material for paper. Patents from wood, like the wasp, nettles, mallows, broom, furze, and many other things. If our weeds will answer, let us use them up; but if cultivation be necessary, let us go on and raise flax.

As to the potato disease. When the disease appears, they immediately cut all the tops off, made the ridges so as to shed rain, left them till the usual time of digging, and saved them. Numerous trials show that this method—that is, cutting off all the tops the moment disease appears, hilling up so as to shed rain and keep air out—saves them. The ridges should be raised up sharp at top.

E. G. Langdon.—"Dr. Massatti, (of Vienna,) believes that the potato disease is the result of the repeated breeding in-and-in of the members of that distinguished family, and recommends as an infallible remedy for their decrepitude, a course somewhat similar to that provided by King David in his old age. The cuttings are to be planted between two or more dahlia and cyclamen tubers, and the result, Dr. Massatti assures us, is, that the dahlias undergo a vicarious rotting, and the potato flourishes luxuriantly.

Amos Gore, of New Jersey—I was on the committee to examine the farm of Professor Mapes during the recent very remarkably long, severe drought, and I was surprised at seeing all his crops as vigorous as if he had no drought. I saw no difference, a full growth marked every plant; ears of corn as large as they ever reach in best seasons, &c. This examination took place on the 7th of September inst.

Paul Stillman, of the Novelty Works—I was on that committee and fully concur in the report of Mr. Gore.

Report of Special Committee on Professor James J. Mapes' farm at Newark, New Jersey:

Henry Meigs,

Secretary of the Farmers' Club of the American Institute.

Sir—In behalf of the committee appointed at the last meeting of the club, to visit this farm and examine particularly what

effect the drought has upon it, and also the effects of his deep ploughing, subsoiling, underdraining and improved fertilizer, the improved superphosphate of lime, &c.—respectfully report,

That the committee, consisting of Paul Stillman and P. Zimmerman, of New-York, Amos Gore of Bloomfield, New Jersey, J. Hinchman of New York, A. Moss of Connecticut, H. Cowing of New Orleans, together with the reporter of the New-York Express newspaper, visited the farm garden of Professor Mapes, on Thursday, September 7, 1853.

The drought had then prevailed for six weeks, with but one shower of about *one inch* of water. The day was delightful, and although perhaps rather warm, no one regretted the excursion. On arriving at Newark, the Professor was on hand with carriages to convey his visitors to the farm, about three miles out of town. We arrived at about 11 o'clock A. M.

The committee first examined the extensively improved superphosphate of lime factory of the Professor. This was a range of wooden buildings. A forty-horse power steam-engine at work made about twenty tons of the Professor's fertilizer per day. This work is done at the periods when his hands can attend to it. The Professor stated the following ingredients of the articles, viz., calcined ground bones, 100 pounds dissolved in 56 pounds of sulphuric acid. When this is dry, 36 pounds of Peruvian guano (best kind) and 20 pounds of sulphate of ammonia are mixed thoroughly with it, and the whole mass is then thoroughly ground and incorporated. He sells this product readily for fifty dollars per ton.

He also manufactures a new manure called nitrogenized superphosphate of lime, which sells at 2 cents and $\frac{5}{8}$ of a cent per lb. It is composed of equal parts of his superphosphate and *dried blood*, the mixture being thoroughly ground and mixed. The Professor estimates its fertilizing power at about $2\frac{1}{2}$ times greater than that of the best Peruvian guano, so that the demand for it was such that he had then on hand (to make it) between *four and five thousand hogsheads of dried blood.*

The committee then went over the farm garden, of about 35 acres, now under high cultivation, out of the 75 acres which constitute the whole. This garden is all underdrained and subsoil ploughed, and notwithstanding this long-protracted drought, the crops upon it are apparently not affected by it. We saw two corn fields, one having the improved superphosphate of lime for its manure, the other the nitrogenized superphosphate of lime (dried blood). The former field indicated 80 bushels of shelled corn to the acre. The latter indicated from 90 to 100 bushels shelled corn to the acre. No hand hoe has been put in the land since the planting of the seed. A fine crop of turnips is growing along side the corn.

The corn fields were planted at the same time, and except the difference of manures, they were both treated alike. Yet the (dried blood) latter field was apparently two weeks earlier. Many of the ears of corn measured 14 and 15 inches in length, and notwithstanding the severe drought they were filled out to the last kernel. We examined pepper plants set out six weeks ago, and since the commencement of the drought. They were not withered at all, but were in full vigor, averaging 30 peppers to each plant, the plants two feet apart.

His vineyard contains twelve hundred vines in full bearing, and they are entirely free from the prevalent disease. His beet crop is estimated at 1,000 bushels per acre, parsnip crop at 1,500 bushels per acre, carrot crop at from 900 to 1,000 bushels per acre.

The Professor's newly-invented lifting subsoil plough runs steadily through the subsoil, lifting it a little, at the depth of fifteen inches, with one yoke of oxen, disintegrating the subsoil about four feet in width.

His sweet mush melons lay in abundance on the ground. He has abundance of the Fastolff raspberry, Franconia, Antwerp and other varieties; the Lawton blackberry; and among other strawberries he has the Hovey, British Queen, Prince Albert, Myatt's Eliza, and some other sorts. During the strawberry season, the Professor sent, in two days, to New-York market, eleven

hundred boxes of these strawberries, and received 30 cents a piece for them. He has in his orchard 150 varieties of dwarf pear trees, some of which are bearing fruit, and the trees are all in fine order. His cold frame plants grow under 300 sashes. Their plants sell in spring for large profit.

He showed his new method of cultivating Lima beans.

He shortens the plants to 5½ *feet*, by which means they are made to throw out side shoots and bear largely increased crops, all of which ripen before the approach of frost.

FARMING UTENSILS.

Of these the professor has a very large assortment. Among them about *twenty varieties of plows*, all of which possess advantages for some peculiarity of soil or mode of cultivation. The committee examined a hoe-cultivater at work. It hoed one hundred yards in one minute and ten seconds, completely destroying weeds to the breadth of two feet and a half. He intends next year to make addition of several implements to his present stock, by which to save much labor.

CATTLE, HORSES, &c.

He has a number of very fine blood cows and oxen. Collectively they were adjudged by the committee to be the best ever seen by the committee.

In a separate barn were shown several fine farm horses, and several span of large, well trained mules. With his oxen, horses and mules, his force is about equal to 150 men, in the manufacture of his fertilizers and culture of his farm and garden. He employs about twenty able bodied men, besides the overseers.

LIBRARY, PRINTING OFFICE, &c.

He here prints his "*Working Farmer.*" His study is connected with his printing office. He has one of the best agricultural libraries in the country.

The committee had an excellent dinner provided for them, and conversation for several hours on farm questions. The professor entertains a low opinion of some market people. It was generally

supposed by citizens, that farmers obtained great prices for their produce; they judged by the high rates of provisions in New-York Washington market and others; but it was not the case; farmers cannot have the huckster high prices. He could make a thousand dollars per acre, at huckster rates. A farmer is not allowed to take his wagonload of provision to market and to sell them. Chickens were selling in Washington market at seven shillings a pair (87½ cts.), and yet he was offered by a New-York huckster *seventeen cents a pair!*

The committee were highly gratified with their visit. Prof. Mapes is willing at all times to impart whatever information he is possessed of. He is a practical as well as a scientific farmer.

Respectfully submitted.

PAUL STILLMAN,
P. ZIMMERMAN,
AMOS GORE,
JOHN HINCHMAN,
A. MOSS,
H. COWING,
Committee.

Mr. Gore—The professor's farm has been without rain for about eight weeks, and yet its crops are superior.

Prof. Mapes—My peppers were transplanted after the surface of the soil was dry as ashes, and the pepper is rather difficult of transplantation; owing to the deep tillage of my land, the pepper flourished as well as in any other season.

Mr. Gore—I saw some weeds there, and they had a luxurious growth.

Mr. Meigs has observed, many years, that weeds are not so hardy as our useful plants in general. I have sometimes seen red root suffer more than my useful plants; their roots are usually short; growing, as they do, in a state of nature, where the land was never tilled, they have the fixed habit of short and surface roots.

Mr. Pardee had visited Long Island during the late drought, and was surprised to see so much fine vegetation there, as the island is generally reputed to be unusually liable to drought, on account of very deep sandy land. At Hempstead he saw fine fields of corn and of buckwheat. On enquiring he was told by intelligent farmers there, that the drought had been more excessive than for many years past. The fields of corn and buckwheat had been well cultivated; the wells of that quarter had not lessened in depth of water one inch; the soil and subsoil there allow deep penetration by roots, so that they get down to moisture.

The Secretary said, that Mr. Solon Robinson, who proposed for to-day the subject of "selling all farm and garden products by the pound," was absent, and the Secretary moved, that the subject be continued to the next meeting of the club, on the 17th of October next, which motion was adopted.

Mr. Albertson examined the experimental farm of Professor Mapes, and was surprized to find it equal in vigorous vegetation to the finest farms in the State of Ohio, where corn is so high that I could hardly hang my hat upon the ears!

Professor Mapes remarked that the prosperity of his crop is due to very deep and thorough tillage, and suitable fertilizers. The corn is cultivated flat, no hilling up to lessen the capability of the corn to stand up in a blow. The late severe gale did no damage that way to my corn crops.

Mr. Smith—A delegate from a settlement company to settle in Kansas was assured of the interchange of agricultural and garden knowledge, seeds, plants, &c., of this club, which desires intercourse with all farmers and gardeners of the whole Republic.

Mr. Amos Gore, of Jersey, proposed that the club consider the subject of full permission to all farmers and gardeners to sell their own crops in our city markets free of charge and embarrassment.

Subjects continued.—"Insects injurious to crops," "and selling all farm and garden products by the pound."

The Secretary read the following letter from Alexander Vattemare, our honorary member:

Paris, *July* 1, 1854.

Dear Sir—I have the honor of presenting you for the American Institute the following books:

1. The Almanack of Algeria for 1819. By O. MacCarthy, Secretary General of the Oriental Society, Paris.
2. The Guide for the Colonist and Almanack of Algeria for 1852, containing highly valuable notes on the climate, health, agriculture, &c., &c.
3. Report of the Emperor on Algeria of 1853. By Marshall Vaillant.
4. Premium Stock for Slaughter. 36 plates.
5. Gasparin's Course of Agriculture. Vol. 5.
6. Economy and Agriculture of England. Translated 1853.
7. Fortune's Travels in China, &c. do do.
8. Agricultural Promenader in the Centre of France. By Count De Gourcy, 1853.
9. Extracts from English Agricultural Journals, 1853. By Count De Gourcy.
10. Practical Instructions in Pisciculture (fish breeding) very curious and valuable. By M. Coste. Paris, 1853.
11. Laws and Documents of France Relative to Drainage. Imperial press. 4to.
12. Notice of the Tulle Factories of Calais and St. Pierre les Calais.
13. Apiculture (bee culture). By Debeauvoys, 1851.
14. Report of Dr. De Bouis on the 5th part of the Natural History of New-York.
15. Report of Dr. De Bouis on Works from United States. By Mr. Vattemare's exchanges.

Dr. De Bouis—One of our most distinguished horticulturists has expressed his high opinion of the merit and importance of the New-York State Geological Report, as a splendid view of its natural history. (Signed,)

Very truly yours,

ALEX. VATTEMARE.

The Club then adjourned to Tuesday, October 17, at noon (because the first Tuesday, October 3, was the first day of the United Fair of the State Society and the Institute).

H. MEIGS, *Secretary.*

Oct. 17, 1854.

Present—Messrs. George B. Rapelye, Prof. Mapes, Mr. Solon Robinson, Messrs. Griffing, Van Wyck, R. G. Pardee, Thomas B. Stillman, Paul Stillman, Dr. Waterbury and others.—20 members.

George B. Rapelye in the chair.

H. Meigs, Secretary.

The Secretary read the following translation, made by him, viz:

Presented by the Hon. Charles F. Loosey, Consul General of Austria.

Chrestomathia Targumico-Chaldaica, &c.; i. e. Choice Selections from the Chaldee Targum, with a Lexicon. 1 vol. 8vo.

Transactions of the Lower Austria Trades Union. New Series. Annual of 1852. Nos. 1, 2, 3 and 4.

New Series. Annual of 1853. Nos. 1, 2, 3 and 4.

Journal of Proceedings of the Lower Austria Trades Union of 1851.

The Strawberry Culture. By R. G. Pardee.

Presented by Alexander Vattemare.

Historical and Statistical Notice of the Manufacture of Tulle, or Bobbinet, at Calais, &c.

Almanacks of Algeria for 1849 and 1852, with valuable Notes of Agriculture, Climate, &c.

Agricultural Walks in the Centre of France. By Count Conrad De Gourcy.

Fortune's Voyages and Travels in China. Translated from the English.

Extracts from English Agricultural Works. By De Gourcy.

Report of the Minister of War to the Emperor of France upon Algeria.

Practical Instruction on Pisciculture (fish breeding). By Coste.

Studies of Agricultural Schools for Beggars, Young Criminals, Orphans and Foundlings in Holland, Switzerland, Belgium and France. By Messrs. Luriau & Romand.

Guide to Bee Culture. By Debeauvoys.

English Agriculture and Economy. Translated by Baucelin Dutertre.

Course of Agriculture. By Count Gasparin.

Competition of Stock for Slaughter in 1853 at Bordeaux, Nismes, Lyons, Nantes and Poissy, and the premiums.

Laws and Documents relative to Drainage. Imperial Press.

Presented by Frederick U. Gerssenhaimer.

The Character of Theophrastus. Translated into English.

FISH BREEDING.

We are much indebted to Dr. Adams, of our city, just returned from Paris, for the perusal of the "Instructions Pratiques sur Pisciculture, &c., by M. Coste.

The formation of nests by fish is curious. We extract the following translation, by H. Meigs.

I placed, in the College of France, circular basins of about six feet diameter and one foot deep, and put into them all the matters necessary for the fish nest making, according to my experience. I then put in a large number of Sticklebacks, male and female, taken when they were about to lay their eggs. A few days afterwards, I saw some of the males choosing permanent residences in various parts of the basin, and very actively employed. I watched all their operations to find out what brought them continually to the same spot. I soon discovered that they were employed solely in collecting materials for a construction requiring all their resources, and I became a witness of the most curious spectacle that it is possible to contemplate.

I saw each male fish busy heaping up in his chosen place, bits of grass and plants of all sorts, brought far and near, with which he was making a carpet. But as his materials were apt to be carried away by movements of the water, he took the precaution

to *bring sand in his mouth* and put it on the grass, &c., to keep them in their places. He then rubbed his belly all over the grasses, and with mucus from his body made them stick together Thus he made the first layer a solid floor on which to build his edifice, which he proceeded to do with great perseverance and even feverish agitation. In order to satisfy himself that his building was sufficiently united, he used his pectoral fins rapidly in making currents of water against their works, to try them, and if a bit gives way, they fix it and glue it over again. All this being done they proceed to employ more solid materials. They get roots and straw, which they carry in their mouths, to add to the first structure. They take a piece, try to insert it; if it does not suit, they pull it out and insert the other end, and make the best possible use of it. Sometimes, in spite of all their pains taking, some piece will not suit on account of its figure; they pull it out and carry it some distance from the nest and throw it away, then go choose a better one. Thus they finish a solid hollow bed, well secured by that viscous (sticky) slime which they employ for that purpose. But the stems, roots, and straws which they select to roof over the bed are always fixed in one direction, that is, lengthwise, so that the ends will extend from one entrance to the nest to the other. After fixing this roof, they proceed to treat it as they did the bottom or carpet. They labor incessantly to finish it perfectly by glueing all its parts, taking particular care to have the two doors in perfect order. When the female is laying her eggs in this domicil, he often puts his head and shoulders in to watch and protect her and the eggs. The circular border of the door is built with the greatest care and regularity; not the slightest bit of grass or other thing obstructs the passage through it. It may be said to be circumscribed with a velvet glacis. This nest is about four inches in diameter, and appears on the bottom of the basin as a small swell or rise. They are as ably made as swallows' nests. These Sticklebacks show as much skill as many birds in making their nests. When the Stickleback's nest is finished to receive the eggs, the male, full of agitation, goes among the females, and tries to call the attention of some female who is disposed to lay

eggs. He offers her his asylum for her progeny. Common males are readily distinguished, for they are now dressed in the rich livery of love! They are dressed in the most brilliant colors! Their cheeks and bellies lose their habitual whiteness, and are now covered with the color of fire! A bright orange or *aurora red!* The back, which is ordinarily of a grayish hue, changes through every shade of green! blue! silver! The female *selected*, &c., soon follows him; he presses open the door of his asylum, then makes way for her to go in. You see nothing but her tail out of the door. She remains there only two or three minutes, during which you see her convulsive efforts in laying her eggs. She then comes out pale and discolored, and has made another hole in the nest. The male's color during all this is changeable, he is agitated, he seems in paroxysms. He helps the female, rubbing her with his nose, and the moment she comes out he slips in, and begins to wriggle over the eggs, and then begins to repair the nest which has been damaged by the female in her agitation in laying. But this nest, whose construction has caused so much trouble, is not only destined to receive the eggs of one single female, but many more, for the male attracts other females to the nest, and for many days in succession—or the same female—so that the nest becomes a rich magazine, where each heap of eggs separately form altogether one large block (un block énorme.)

The faculty of the female of laying her eggs at different times, more or less variable, explains the prodigious multiplication of these fish. One nest often contains from one thousand to two thousand eggs. The male is the only guardian of the eggs, for the female not only does not take any care of her eggs, but sometimes forms coalitions with other females to invade the nest and ferociously devour the eggs. The male has to watch the eggs for a whole month, until the hatching. He covers the nest with stones half the weight of his body; he closes the door one side and watches the other hole, keeping up currents of water to the eggs to wash them incessantly, for the eggs would perish without it by the formation of a cottony covering. He protects the infant fish for a long time. They are hatched with an umbilical cord attached, so large as to be difficult for them to move well on account of its weight. The male will not permit one of them to

leave the nest. If one gets away, he immediately goes after it and brings it back in his mouth; sometimes he is obliged to seize several at once—this he does, but never wounds any of them. A hen does not watch her chickens more carefully. For fiffeen or twenty days the male watches the young as a shepherd-dog watches a flock of sheep, moving continually around them. He is remarkable for his voracity except during this period, in which he maintains an almost complete abstinence.

These Sticklebacks are polygamous; much more intelligent than is generally supposed, and their nests are found from March to August.

In China, in the month of May or thereabout, large numbers of boats assemble in the great river *Yang the Krany* to buy *fish seed*, a custom since the most remote antiquity. The country people here bar up the river with mats and screens for eight or ten leagues, leaving only a space open for the boats to pass one at a time. The fish seed is seen adhering to these mats and screens, yet a stranger could not discern a single one in the river. The people fill large vases with this fish seed water, and sell them to dealers, who send them to the streams, ponds, and rivers which they wish to raise the fish in. The Romans used to do much the same thing, and sometimes on a vast *scale!* Sowing fish eggs almost as we sow grain, and even succeeding in sowing the seed of salt water fishes successfully in fresh water. The Roman lakes, Velinus, Sabatinus, Vulsinensis, and Cimnius, in Etruria, were thus peopled with the sea fishes, bass, gilt heads, mullets, and others. The rustic descendants of Romulus, and of Numa, practiced this breeding of fish as a measure of great public utility; their foolish descendant despised and lost so useful and valuable an art.

We thank Dr. Adams for placing before us this very interesting work of M. Coste.

HENRY MEIGS.

AGRICULTURE OF SHANGHAI.

Mr. Fortune, the interesting traveller in the East, speaks of it thus:

"Without a doubt, the plain of Shanghai is the richest part of all China, and perhaps its fertility has no equal on the globe. It may be said to be one beautiful, grand garden. The soil is a very deep, rich loam, producing wheat, barley, rice, cotton, a great quantity of vegetables of all sorts, cabbage, turnip, carrot, yam, egg plant (aubergines) cucumbers, &c., &c. It is the grand centre of product of the Nankin cotton.

The Moutan Pœony, or Tree Pœony

Is said in China to have been discovered growing in the mountains of Honan fourteen hundred years ago. On being cultivated it became very superior to its original wild condition. It was, however, for a long time unknown. About the middle of the seventh century it became a subject of enthusiastic culture. The missionaries of that day relate that one of the trees, over twenty-five feet high, was presented to the Emperor. It was called King of Flowers, and the *Hundred Ounces of Gold*, as that sum had been given for a single plant.

The Nankin cotton of China does not differ in the general form or growth from the white cotton, and, indeed, sometimes the seeds of it yield white cotton, and sometimes we see in the field white cotton and yellow or Nankin. The Chinese find the best manure for cotton to be the mud of the ponds, canals and ditches, formed of the decomposed plants, reeds, sedge, &c. They begin in April to get out this mud; they let off the water wherever they can, get out the mud and lay it in heaps on the banks. After letting it drain a few days they spread it on the field for cotton. They pulverize the soil first with the plough, drawn by buffaloes, then work it all over with their three-pointed hoe until the soil is perfectly worked. The mud is, at first, not very friable, but rains soon dissolve it and carry it into the soil in some measure.

They use the scrapings of their roads, and they burn brush and weeds for manure.

Winter wheat is ripe at Shanghai about the last of May. They plant cotton seed between the middle of April and the middle of May in their wheat fields, so that when they harvest the wheat about the end of May the young cotton plants are a few inches high. Before the cotton is ripe you see clover, beans, or other plants growing in the same fields. They sometimes sow cotton seed broad cast, and *tread the seed in* very carefully. They sow broad cast extremely even and regular. The seeds pressed into the soil thus together with the manures which are on the surface, grow immediately and well. Sometimes they sow it in regular lines, but seldom, however. When sown in lines they manure it with the oil cake from their cotton seed oil factories.

Translated from the French edition by H. Meigs, October 11, 1854.

[London Farmers' Magazine, August, 1854. Extracts by H. Meigs.]

At a meeting of the Royal Agricultural Society at Lincoln, a member said that an old friend of his, and one of the best experimentalists in Great Britain, the late Mr. Fleming, of Barrochan, when he had said to him, "Give me in a nutshell what you have learned in the course of your scientific investigations," had said to him in reply, "Mix your manure; do not trust to guano, or to farm yard manure exclusively, but put small portions of each together." *Admixture is the thing* I say.

At the exhibition the Dorking poultry appear to be ahead of all others.

We hear nothing of the much hoped-for *Forking machine.* We hope for our Gibbs and Mapes to do that right first.

They tested the deep ploughing by the ploughs of the Ransomes and the Howards, eight horses to draw one, three men to hold on, and nobody knows how many to drive. The test was pronounced by the public and admitted by the steward to be "perfectly absurd." Croskill's bell reaper was beaten fairly by Dray's machines.

Prizes of £40 sterling to cattle, £30 to horses, £30 to sheep, £15 to boars, £20 to Dray's reaper, £20 to Hornsby & Son for

best portable steam engine, not more than eight horse power, for threshing and other farm purposes. Not a word about the forker, either that of Samuelson or anybody else. The Earl of Harrowby (good title) said, that agriculture, manufactures and commerce were all sisters of one family; and like the sisters of families a little disagreement occurred among them at one time. Happily that time had gone by. The agriculturist was a manufacturer. He manufactured beef and bread for us to eat. (Cheers.) The Mayor said that the superbly cultivated heaths, wolds (plains), and fens (marshes) of the country, and the enterprize, energy and industry displayed in their reclamation and culture, afford the most striking and brilliant proofs of the triumphs of *science over ignorance*, of energy and *intellectual power* over supineness and lethargy, and a *liberal capital* over *heartless* neglect and *covetous frugality*.

We now see these lands smiling in all the luxuriance of productive nature, bidding defiance to that element (water) which, by the aid of science, has now been chained within its narrow limits and left to perform its allotted functions of fertilizing and moistening the arid soil, *instead of breeding pestilence and corruption* to the beast, and death and destruction to the vegetation. (Loud cheers.)

Mr. Solon Robinson observed that a very useful and instructive volume on the subject of breeding fish, by William H. Frye, is now published by the Appleton's, and he advised all who wished to practice and amuse themselves to have it.

The Chairman called up the subjects of the day, viz., Insects injurious to crops, and the sale of all farm and garden products by weight.

Judge V. Wyck, who had proposed the first of these questions, viz., Insects injurious to crops, said he thought that insects, even during the present year, severe as the drought had been, had done nearly or quite as much damage to our crops. The effects of the one are seen and felt by almost every body, the other works more quietly, and, in a great degree, under cover. We are not fully aware of the extent of the mischief they do until we come to gather and realize our products. In looking over the public

journals of our country at different periods of the present season, east, west, north, south, every quarter we find has sustained more or less injury. The south and west, perhaps, considerably the greatest, as the enemy from the higher temperature and larger surface of these quarters are more numerous. Several destructive kinds prey upon our friends of the south and west, which annoy us but little, comparatively. Among these are the *curculio grenarius*, as the great naturalist, Linnæus, scientifically calls it. The English of which is grain weevil. It belongs to the beetle tribe, which contains a great many species, and some of them very numerous. The curculio is one, which competes in numbers as well as destructiveness with any of them. The number of the curculionidæ may be imagined when it is stated that entomologists have found it necessary to distribute them into nearly three hundred subgeneras.

It is only intended here to notice insect enemies of the grains or bread stuffs, and our limits will necessarily confine us to a scanty and very imperfect examination of these. This arises in a great measure from the mighty character of the subject. Dr. Harris, an American, and who has written more largely than any other entomologist of our country, puts these last named insects under the genus *Coleoptera*. Small as it is, both in the beetle and grub state, it devours wheat in the field and other grains, and commits much havoc in barns, granaries and brewhouses; Indian corn and rice suffer much by it. Dr. Harris says, "I am not aware that these weevils attack wheat in New England; but I have seen stored southern corn, swarming with them, and should they multiply and extend in this section of the country, they will become a source of serious injury to one of the most valuable of our staple productions." These insects are effectually destroyed by kiln drying the wheat and grain, and keeping it cool, well ventilated and frequently stirred or moved, and many may be destroyed by winnowing the chaff and the use of alkaline solutions of various substances in certain states of the grain. This insect or some of them is so small, as to hatch in the kernel from the egg deposited there, and live on the flour or inner substance until they are ready to leave it, and there is nothing but the hull left, the grain shews

this decidedly when it is used or weighed. Its powers of multiplication are very great, a single grain, it is said, will have 6,000 descendants in a season. A species or variety of this weevil will not only destroy the plum, nectarine, apricot, but also the peach, pear and apple; Dr. Harris and others have seen them in the act of puncturing these, and the effect some time after on the fruit.

The *Chinch bug* of the *Hemiptera* order, have committed great ravages to the South, especially Virginia, this season on grain. Dr. Harris thinks, from the manner in which Kirby and Spence, the great English entomologists, speak of it, it is little known in England or in Europe, and its habits very imperfectly understood here; it has been confined in its ravages as yet, pretty much to the South and West. The wheat caterpillar is very destructive to grain, both before and after it gets ripe; it infests every section of our country, north and south, and belongs to the genus or order *Lepidoptera*. There are a great many generas, orders, species, and varieties into which this family is subdivided. It is one of the most numerous and perhaps most so of any of the insect races; some of the species are four or five years in reaching the last stage, the winged state, and it is said by naturalists who have made the calculation, that the third generation of the whole living at one time will make 657 thousand millions; a few years would place its numbers beyond the power of figures to estimate, and the amount of mischief they do, equally inestimable.

The *Joint-worm* or, as naturalists generally call it, *Euritoma*, is a destructive insect to wheat and has done much mischief this year, especially to the South. Dr. Harris recommends burning the stubble after reaping, and the straw, and *winnowing*, as it is near the second and third joint of the stem they deposit the egg. This insect is in the order *Hymenoptera*.

The *Diptera* order contains insects highly injurious to wheat, in the north and east they abound most, such as the Hessian Fly, c., scientifically called *Cecidomyia Tritici*, meaning *Wheat Fly*.

The Europeans understand the character and habits of insects better than we do; they have been longer infested with, and suffered much more by them than we have. Besides various minor

remedies, some of which we have noticed, to destroy or diminish the numbers of insects (for they do not expect, nor can any people think of doing little more than lessen the evil), they have organized in France, in years when the enemy abounded, armies of men, women and children to scour the whole country, fight and destroy him or as many as they could. These efforts were paid for out of public funds, set apart for the purpose, and distributed by commissioners appointed to decide on the value of the services of each one engaged in the fight. These were estimated according to the number or weight of eggs and skeletons of insects produced by each combatant. Women and children are as competent for this work, and perhaps with a little drilling and practice more so than men; the pay, little as it may be, would rouse them to the contest, which could not be expected to be efficiently waged, without such a stimulus.

France has paid in one year, when the enemy was very numerous and destructive, more than twenty million of francs towards his extirpation by such means. It is said by the highest authority in France, that the damage done there by insects will amount to more than fifty million of dollars a year, on an average of many years together. Besides, Europe, especially Britain, France, and some other nations, preserve with the greatest care all insect eating wild animals, beasts and birds, by enacting severe penal laws against those who destroy them, and have such laws strictly enforced. We shall, at some future day, if we do not now, have to adopt all these measures, with others, if we wish to protect ourselves more efficiently against the ravages of insects. Our country has increased immensely in surface and population within a few years, the products of its soil of every kind increased in proportion, and the enemy that preys upon those last has multiplied perhaps a thousand fold, and likely to continue so to do unless vigorously checked. His food is not only thus increased in quantity, but in delicacy, richness, and variety, and such an increase of numbers and increased consumption of food, often occasion dearth, especially when combined the same season with the damage done by drought. This has often been the case in ancient and modern times, and quite recently with several nations of Europe; we

may learn from these the best means of resisting such an enemy, and crushing him before he becomes too powerful, or at least diminishing his numbers to such a degree as to render the mischief he does comparatively trifling.

We will here refer to recent works of two or three distinguished entomologists of France, and cite a few facts and references therefrom, to show more strongly the destructive character of insects. M. Delamane states that France is distinguished alike for the miseries of her revolutions and the ravages of her insects. In a year (he says) they destroy as much as all the French eat in five weeks, and two species alone devour annually more than three millions of men. If the corn destroyed by insects every year in France were placed upon single horse carts, the string would be as long as a tenth of the circumference of the globe. A little coleoptera, or shield wing of the kind, called curculio by Linnæus. stands pre-eminent among the destroyers of the vegetable food of man. Sometimes all the grain in a granary is devoured by this insect, and nothing left but the chaff; it is most tenacious of life. It has been known to live and multiply several years under a coating of mastic and plaster, by which the farmer flattered himself he had rid his barn or granary of them forever. This insect, with several others, these authors state, destroy more grain when housed or stored than they do in the field. These enemies of man have been hitherto combated in three ways: by lowering the temperature of granaries; by turning the corn, and by strong odors. They dislike the smell of ammoniacal salts. Saperda tenuis is another coleoptera, or shield wing, which destroys the corn. M. Marquart and M. Germar have described several other beetles which injure corn; one, the Zabrus gibbus, which conceals itself in the earth during the day, and comes forth in the night to eat barley and wheat. The Elater (agrilus) segetis is noticed, its larvæ are long, straight, yellowish and hard. They run under ground, and by eating the roots destroy the plants, and do great damage. A kind of cake called *des tourteaux de cameline*, pounded into powder and scattered upon fields where they appear, is said to protect corn from their ravages. This insect ought also to be attacked in its winged state, and before it has time to lay its

eggs. The *alucite des grains* is the lepidoptera of which the French speak as the *Terrible !* Every year a formidable competitor of man in the struggle for the bread of life. It made itself memorable for all time, by causing a frightful famine at Angoumois in 1760. Duhamel and Tillet observed it at this epoch with great care, and gave many interesting details of its habits. It is of the genus *phalena*. The alucites lay their eggs in autumn in the barns, and in the spring in the fields. Dr. Harpin, a member of the Conseil General of the department of the Indre, says: "In twelve or fifteen of the departments in the middle and south of France, where corn is the staple culture, the standing wheat and rye are attacked prior to their maturity by myriads of alucites, the larvæ of which are lodged in the farinaceous substance of the grain, which they replace with their excrements. The insects pass through their various transformations within the protecting envelope of the grain. When harvest comes, a fourth or a third, and sometimes more of the ears are entirely devoured. Most of the other grains although apparently intact, contain the genus of the destructive insect. The larvæ are so numerous, that when a handful of grain or ears are squeezed a white and viscous fluid issues out, which is composed of the bodies of the crushed insects. The crushed husks remain flat and empty, and agglomerate together as if they had been wetted. The ravages of the alucites in the granaries and barns reach such a point, that if the threshing and grinding is delayed a few months, three-fourths and sometimes seven eighths of the harvest are lost. The bread made of such corn, especially when it is not sufficiently sifted, contains the remains of the bodies and excrements of the insects. It has a disagreeable and disgusting taste, which catches the throat. The bread does not adhere together, but separates in water as easily as a lump of earth. An epidemic malady in the throat, of a very dangerous description, which had reigned of late years in the countries ravaged by the alucites, is ascribed to the use of this most unwholesome bread."

Cecydomyia tritici, a little fly about the tenth of an inch long, has often caused dearths in different nations of continental Europe. The famine in Ireland in 1845, has of late been traced by some of

the diligent and able entomologists of Britain, in a great measure to a single insect. The application of entomology to agriculture, at which Andouin, Batzbourg, and others in France, have labored, promises very valuable results. One of these learned, useful and diligent authors, sums up by saying: "Exact calendars of the epochs in the lives of the noxious insects, cannot fail to be useful to farmers, and every man who has the use of his eyes, and pen and ink, can assist in the preparation of these calendars. Probably they will ultimately have to be combined with meteorological and botanical observations, before they can enable man to gain the victory in the battle he wages with insects for the bread of life." We Americans will have ere long to wage a similar contest, and we fear unless we conduct it with more vigor and unanimity, and less incredulity as regards the power of the enemy, we shall not succeed even in diminishing his numbers to such an extent, as to make the mischief he does much less felt.

Prof. Mapes remarked that the practical facts in relation to insects was all he could speak to. Soils full of undecomposed root-like fibres were annoyed by insects as well as those containing too large a proportion of decomposable matter; but after the addition of the necessary inorganic constituents, and after proper disintegration, a majority of the insects would disappear. He also spoke of the use of common salt, and its application to the surface of soils as a means of removing a large class of insects. Lime and other alkalies were referred to, as were also the use of tobacco dust and some of the noxious mixtures. The application of a solution of caustic soda to the surfaces of trees would decompose the ova and the cocoons of insects. He described the *insect lamp* and the preventive principles of the *melon box*, which he thought arose from the peculiar method of flight of the coleoptera insects rather than the glass cover of the box, which might as well be dispensed with when the box is properly constructed. He also mentioned the use of clay placed on the ground under plum trees, to prevent the deposits of the ova of curculios in the earth, for rain caused the particles of clay to close up the pores of the soil and render it impenetrable to them.

Dr. Waterbury remarked that some persons leave *lawn* over the boxes to exclude insects, but experience shows that boxes are sufficient. Those insects which we wish to shut out do not love to go over the upper edges of boxes.

Prof. Mapes—I have ten thousand boxes on my farm, which are cheap and effective. I have tried millenet and glass plates. The boxes keep out grubs and the flyers (insects that fly). Some of them cannot hit the plant within them; they fly in small circles and hit the boxes, but rarely get in.

Question on subjects for the next meeting decided on Mr. Robinson's "The Sale of all Farm and Garden Products by Weight," and Prof. Mapes' "Winter care of Cold Frames; Winter Management of Manures, and Winter Warming and Ventilation of Stables."

The Club then tasted of the pears presented by R. G. Pardee, Esq., from Messrs. A. J. McClure & Co., of Marion, New York, grown by Mr. Sheldon at Huron, Wayne county, New York.

All the members pronounced them of admirable flavor, and melting (fondante) in the highest degree—an inestimable pear.

Adjourned to first Tuesday of November, at noon.

H. MEIGS, *Secretary.*

Nov. 7, 1854.

Present—Messrs. Prof. J. J. Mapes, Solon Robinson, Vail, Van Wyck, Hamil of Russia, Dr. Green, Mr. Laverriere, a Director of the Agricultural School of Mexico, Geo. Bacon, Geo. B. Rapelye and others.—20 members.

Mr. Vail in the chair. Henry Meigs, Secretary.

The Secretary read the following papers prepared by him:

Agave Americana.

The word *agave* is from the Greek αγαυος, from Αγαω, to astonish, or *the Admirable American Hemp.*

The temperate latitudes of America produce a genus of plants like aloes. It is many years preparing its fibres.

PAPER.

History says that Cassius Hemina, an ancient annalist, speaks of some books which were found in the tomb of *Numa* when it was opened, 535 years after his death, made of paper, and interred with him nearly 700 years before our Savior.

The first paper was made from papyrus, the next from cotton by the Chinese and Persians, and then the Arabians. This ancient paper shows no wire marks; a different process from ours must have been used. Cotton paper was made about the year 900 or 1000. Linen paper is supposed to have been invented about the year 1200.

In 1721 Great Britain produced about 300,000 reams of it; about two thirds of the whole consumption.

Attempts have been made to make paper from the tendrils of the grape vine, from stalks of nettles, thistles, mallows, bark of the willow, hawthorn, beech, aspen, lime, hop vine, straw.

Fourdrinier's paper-making machine is justly admired. A continuous web of wire is carried evenly on rollers, is accurately covered in its progress with the paper pulp in the required quantity; makes 25 superficial feet of paper per minute; takes rags on one day and delivers the paper made from them on the next day. The old method required three months. Hand made paper is sometimes 4 feet 7 inches long, by 2 feet 7½ inches wide. The machine made paper is 5 feet wide, and as long as you please to run it.

FLAX.

There are about 80 flax-spining mills in Ireland, which contain 500,000 spindles, and yield 9,000,000 bundles of yarn a year, worth about $11,000,000. What an immense number of fingers and spinning wheels must have been used formerly before machinery was used.

ACRES OF FLAX.

Year.	Acres.	Year.	Acres.
1812,.....	73,000	1823,.....	95,000
1813,.....	52,000	1824,.....	112,000
1814,.....	62,000	1825,.....	86,000
1815,.....	91,000	1847,.....	58,000
1816,.....	93,000	1848,.....	53,000
1817,.....	57,000	1849,.....	60,000
1818,.....	83,000	1850,.....	91,000
1819,.....	77,000	1851,.....	138,000
1820,.....	91,000	1852,.....	139,000
1821,.....	80,000	1853,.....	175,000
1822,.....	86,000		

Between 1826 and 1846 there was a gradual falling off. The Flax Society have increased the crop *three fold.* Its talented and active secretary, Mr. McAdams, is worthy of all praise. The society receives £1,000 sterling ($5,000) from government for its support.

In 1843 I commenced the collection, from the Board of Trade Office, of the annual imports of flax, oil cake and flax seed from Russia, Belgium, &c. I found that Great Britain paid annually for these seven millions of pounds sterling ($35,000,000), and that Russia received out of that sum nearly $12,000,000.

J. H. DICKSON.

February, 1854. Lord Harris has given $1,000 for premiums on best native farming in Trinidad.

Royle.—Exposure favors the formation of woody fibres, but as we know in timber trees, this lessens their flexibility. Therefore, when hemp and flax are cultivated for *their fibres*, they are (in Europe,) sown thick, and closer and closer as the fibre is required to be of finer quality. In India, where flax is sown for its seed, it is sown in lines, as an edging to other crops, so that exposure is equally secured, a good crop of oily seed produced, but the fibre of such flax is short and brittle, and unsuited for the general purposes of flax.

India possesses various fibres from several fast-growing plants, some deficient in strength, others remarkable for a coarse, harsh texture, and not remarkable for strength. It has been inferred by some intelligent men, that the heat and moisture of East Indian climate are unfavorable to the production of good fibres. But India grows plants in some of its barren, dry plains, whose fibre is as strong as any in the world, and contains a vast number of such plants.

In 1850, Calcutta exported about 600,000 lbs. of sunn-hemp; 700,000 lbs. of jute; nearly 9,000,000 gunny bags, &c., &c. (India *maunds* are 82 lbs. each.)

Fibres of liliaceous plants were examined having very showy flowers; mere pressure caused the fibres to appear very white, of great beauty for paper. By the names of Moorghae and Marool, it is used all over India, on the coasts of Coromandel, Malabar, and Bengal. Tried in Calcutta, ropes of it broke at 137, while Manilla hemp broke at 138 lbs.

The Agave Americana and Agave vivipara have strong fibre. Humboldt mentions a bridge 131 feet long, whose ground work was formed of ropes of Agave Americana. The fibre from the leaf of the pine apple is very strong. Beautiful cloths made of it were exhibited in the Crystal Palace, in London, 1851, from the Phillipine Islands. The natives gum the ends of fibres together for a time, not (as an old writer said,) by invisible knots. Pine apple fibre is better for making muslins than ropes.

Banana plants are cut down annually to have fruit from a new growth. Each stem has about four pounds weight of fibre in it, capable of being wrought into all sorts of fabrics, coarse and fine. It is strong. The fine fabrics made of it are extremely elegant. It makes good paper and is fit to make ropes. Each pine apple plant yields about three pounds weight of fibre, or about 9,000 pounds an acre, at least. The meanest man in the tropics has a plantain in front of his hovel, the stem of which is of no use for fuel or for manure. The fibre is easily got by passing the stem through rollers. The fibre, like that of the Manilla hemp, was of the genus Musa. Drawing and packing paper, and fine hand-

kerchiefs made of it were shown. The Corchuous or Jute of India, of very long fibres were shown. Fibres from the mallow tribe, and also from the stem of the cotton plant were exhibited, the brown hemp of India, the Sunn plant, and the Danche, which latter is valued in Bengal for making ropes which stood the wet well.

Test of fibres at the East India Company's Military Stores Office.

Petersburgh hemp, ...	broke with	160 lbs.	weight.
Jubulpore, (India,)	do	190	do
Travancore (India,)	do	175	do
Mudaror Tercum, common to to all India, ...	do	190	do
China grass, Bachmiria Nivea,	do	250	do
Rheea fibre do from Assam, ...	do	320	do
Wild Rheea, Bochmeriœ, species from Assam,.....	do	343	do

Kote Kangra hemp, (no breakage at,) 400 lbs.

India House, Dec., 1853.

The family of Nettles was noticed, a beautiful fibre from them was on the table from China, which sold for £120, ($600,) a ton. It was greatly admired. The calove was pronounced the strongest fibre ever seen by Dr. Roxburgh.

The quantity of fibrous matter used in Great Britain was about 614,000 tons. Electricity is recommended in working fine fibres. A flax fibre will work very well, if passed through machinery by *one* of its ends but not *the other*.

The average yield of grain annually in England, is about 20 million quintals (160 million bushels).

In Great Britain and Ireland there are 70 million acres capable of growing food, and that would supply 100 million of people.

CULTIVATION OF GREAT BRITAIN.

Acres cultivated.	Uncultivated.	Unprofitable.	Sum.
46,522,970	15,000,000	15,871,463	$77,394,433.

Arable and garden lands cultivated,..... 19,135,990 acres.
Meadow and pasture,..... 27,386,980 do.
Waste land, capable of improvement,..... 15,000,000 do.
Incapable of improvement,..... 15,871,463 do.

JAPAN PEA.

On the suggestion of a member of the Institute, the Hon. Mr. Dissosway, the secretary of the Farmers' Club sent to Mr. Roberts, President of Liberia, some Japan peas, grown in the garden of Walter M. Oddie, Esq., of Bedford, Long Island. They are believed to be peculiarly adapted to the climate of the Republic. A request for seeds and plants suitable to U. S., was made with an offer of any seeds and plants, which President Roberts may deem suitable to Liberia.

H. MEIGS, *Secretary.*

October, 1854.

MATERIALS FOR MAKING PAPER.

[From the Journal of the Society of Arts, London, June 16, 1854. An elaborate paper, by Dr. Forbes Royle, F. R. S., on Indian Fibres, fit for textile fabrics—ropes, papers, &c.]

The Rheea fibre of Assam is superior to Russian hemp and flax, New Zealand flax is enquired into (*Phormicus Tenax*).

Cremlin Road, Belfast, May 26, 1853.

We now hand you two samples of yarn spun from the New Zealand flax you sent us, viz: (2 cuts 51–2 lea yarn, and 11 cuts 10 lea ditto). We did not consider it practicable to spin this flax by machinery in the state we received it from you, owing to the *fibre being so very* brittle and having "nature" in it. The yield is about the same as from strong Irish flax, both as regards *line* and *tow*. It is extremely strong.

MITCHELL, BROTHERS.

Soho Foundry, Belfast, May 1, 1854.

We have tried the New Zealand flax in our flax scutching machine, the patent one, McBride's. We return to you the flax dressed by it, in a very few minutes; of no use for finer manu-

factures. The machine dresses a ton of the New Zealand flax in a day. This *Phormicus Tenax* is the third in strength of known fibres; It is decidedly inferior for most purposes to flax (*Linium usitatissimum*). It is from a mass of fibre on the lower side of this liliaceous plant. The fibre is very brittle when knotted. Mr. Grattan, a chemist of Belfast, examined it with microscope. The fracture of it, when knotted, resembles the splinters of hard wood; has not the thready attenuated appearance of broken flax. The fibres of it are singularly even in size, and regularity of position, stretching from the top to the bottom of the leaf, in exceedingly beautiful parallel lines, a splendid looking fibre; what a pity that it has such striking defects. It will not bear wet well, will not stand bleaching well; some dewrotted is nearly bleached, however, and had its strength.

Analysis.

	New Zealand flax straw.	Irish flax straw.
Water,	60.39	56.64
Organic,	37.88	41.97
Ash,	1.73	1.39
	100.00	100.00
Potash,	14.93	20.82
Soda,	5.38	2.07
Chloride of sodium,	8.75	9.27
Lime,	28.52	19.88
Magnesia,	1.41	4.05
Oxide of iron,	1.21	2.83
Sulphuric acid,	4.64	7.13
Phosphoric acid,	18.96	10.24
Carbonic acid,	13.12	10.72
Silica,	3.86	12.80
	100.78	99.31

By William Charley, *Flax grower in Ireland.*

A society for the encouragement of flax growing in Ireland has succeeded, within the last three or four years, in causing the number of acres growing flax to rise from 50,000, and highest 90,000, for forty years past, to 177,000 last.

[London Farmers' Magazine, Oct., 1854.]

SUBSTITUTE FOR POTATO.

A sort of yam from China, called there *Sain-In*, consumed there as largely as the potato with us. A bulky root, rich in nutritious matter, eatable raw; cooks easily; tastes like flour or starch; is better than potato or sweet potato.

[Annales De La Societe Imperiale D'Horticulture. Paris, August, 1854.]

GLUE AS A FERTILIZER.

[By M. Lierval.]

After having studied practically the uses of glue and gelatine in watering plants—the great benefit of which has been heralded lately—I have found practically that strong glue or gelatine may be advantageously employed in place of all others hitherto used.

Among the organic matter which can be assimilated by plants, tannin is one, which, by combination with gelatine, becomes useful to the nutrition of plants, but without it very difficult.

Tannin must be placed in the front rank of the principals produced by the bark, the woody fibre, and roots of undecomposed trees and shrubs.

Strong glue dissolved in water combines not only with tannin, but also renders soluble a great number of metallic oxides and salts, which remain in some soils insoluble in water.

Glue of inferior strength is nearly as efficacious as a fertilizer, and should be used in preference on account of its much less cost.

The solution of strong glue decomposes readily especially when heat is present, then acidifies, then becomes ammoniacal, putrifies and gives out a very fetid odor. This smell is easily obviated by adding to the solution of the glue ten per cent of animal black, or of finely pulverized charcoal. It is not necessary that the solution should putrify before using it, for the decomposition takes place in the soil and acts even more advantageously.

The decomposition of glue forms a great quantity of ammonia and carbonic acid. The nitrogen or azote unites with the hydro-

gen to form the ammonia, and the carbon unites with the oxygen to form the carbonic acid, while another portion of the carbon (a feeble one) is set at liberty, so that the equivalent of the hydrogen is absorbed by the earthy substances, or is evaporated into the air. These two compounds, in their nascent state, combine and form carbonate of ammonia, a salt which has the property of dissolving humus in large quantities, and that is the nutritive principle of plants.

By its decomposition and the transformation of its constituent principles, gelatine has a high degree of nutrition, and maintains, first, a regular humidity; second, supply to the roots of the elements within their reach.

All plants contain more or less of tannin. Soils made from wood are favorable to plants on account of the tannin in them.

Blood and albumen, coagulated or dried by heat, or in solution, have pretty nearly the same effect as glue. But they have this inconvenience: they attract flies and worms, and have an unpleasant smell.

Horn acts like glue, but is long in decomposing.

Watering with glue solution is very useful to young transplants, carrots, beets, cabbages, &c., &c., and also for nursery trees.

Selection and translation by H. Meigs.

[Journal of the Society of Arts, London.]

IMPORTANCE OF AGRICULTURAL STATISTICS.

[By M. Leone Levi.]

Cultivated Land.

Great Britain and Ireland.	France.	United States.	Russia.
22,000,000 acres.	72,000,000	118,000,000	243,000,000

Produce.

Wheat—			
336,000,000 bush.	576,000,000	100,000,000	1,400,000,000
Pigs—			
19,000,000	ab't 5,000,000	30,000,000	12,000,000

Produce.

Great Britain and Ireland.	France.	United States.	Russia.
Horses—			
1,600,000	2,818,000	n'r 5,000,000	18,000,000
Cattle—			
18,000,000	near 9,000,000	18,360,000	25,000,000
Sheep and goats—			
50,000,000	32,000,000	22,000,000	50,000,000
People—			
27,000,000	near 36,000,000	23,000,000	68,000,000
Potatoes—			
34,000,000 bush.	.....	65,000,000	.....
Oats—			
11,000,000 bush.	.....	146,000,000	....

Solon Robinson exhibited two potatoes grown by Mr. T. H. Matterson, of Sherburne, Chenango county, State of New-York, which were deemed as fine specimens as had ever been seen by the members of the club. They are supposed to be of the kind known as *Peach-blow* and old English White, and are of remarkable specific gravity for their size. The weight of one of these is seventeen and of the other eighteen ounces. Mr. Matterson says, "I send these samples in proof of the accuracy of your recent statement that potatoes have not been more plentiful or of better quality for years. A piece of ground, from which, last season, I had only about fifteen bushels, has, this year, yielded sixty bushels, and with no change in the mode of cultivation; besides, either of the samples I send you is as large as any four I dug last year. As far as I know, the crop this year is abundant, and the quality excellent, and I see no earthly reason why the citizens of New-York should be compelled to pay such exorbitant prices for this important vegetable, except the one you have lately given, viz., *the interests of speculators.*"

Mr. Robinson remarked that the place where these grew was, perhaps, fifteen hundred feet above the sea level, and had not been affected by drought as much as other sections.

From observations this year he is satisfied that dry seasons, with late rains in moderate quantities, are best for potatoes, because the roots that take up the pabulum lie close to the surface. He is in favor of planting large whole potatoes upon deeply ploughed land, but near the surface and cultivated level. Never hill your potatoes. All the manuring should be of top-dressing, or lightly incorporating the fertilizers with the surface soil. The great thing for potatoes is potash and carbon. It is a good plan to mulch the land deeply after the potatoes are planted, and never do anything more to them. For seed potatoes add more mulching, and let them remain in the hills until spring. Good crops of potatoes have been grown under swingletow, upon a grass sod.

Professor Mapes remarked that the potato roots do not enter the soil deeply, and, therefore, in dry seasons often flourish well in land not deeply ploughed, the pabulum not being sufficiently divided by moisture to sink below the range of their roots; and such soils as contain the largest amount of carbonaceous matter produce the best potatoes in all seasons, from the power of carbon to receive and retain ammonia from the atmosphere and decaying matters, while the presence of large portions of organic matter, by their decay, furnish potash, and for this reason, one of the cultivators on the Newark meadows, which are formed of black, carbonaceous soil, usually known as black muck, has, for many years, raised 500 bushels to the acre.

The subject of selling every kind of farm produce by weight was then discussed, and seemed to meet with general approval.

Mr. Solon Robinson said he wanted no better argument than these big potatoes, because there would be no fair honest way of measuring such tubers. A single potatoe kept off the measure would be a loss of several cents to the purchaser. Some persons would buy small potatoes in preference, thinking that they would get more food, owing to the large interstices between the tubers. That, however, is a great mistake. There is no rule so fair as weight for every thing, particularly eggs and wood. How can you sell cabbage, beets, carrots, parsnips, and many other coarse vegetables, honestly, in any other way?

The potato and apple merchants have an easy way of filling up their barrels, when not over three-fourths full. They clap a tub over the top of the barrel and upset it, then turn it back upon its bottom, and *presto! change!* the barrel is full. It is full time that we had a change in our laws of trade, so that we should know what quantity we are entitled to in all our purchases. It would be of equal advantage to the farmer, and be a great promoter of a greater degree of honesty.

Mr. Mapes remarked that there was no greater mistake than to suppose that small vegetables would stow more closely than large ones, except relatively to each other. Every practical man knows that a bushel of large potatoes weighs more than a bushel of small ones, and after they are cut in two and thrown promiscuously back, they will be found to have increased in measure materially. Large logs of wood after having been split up, are increased in measure. Four cords of logs will make five cords of split wood. Eggs are often of double size, and should be sold by weight and not by the dozen. The modes of measure adopted in our markets are truly ridiculous, and equally so elsewhere. In Cambridge, England, and many other places, butter is sold by the yard, after having been forced through an opening with a machine like a sausage stuffer. Beets, carrots, and parsnips, cannot be measured with any correctness. The number that can be placed in a bushel measure, depends entirely upon the skill of those who pack them. If all our farm products were sold by weight, farmers would soon discover that large specimens would give the greatest number of pounds per acre, instead of smaller ones produced in greater number, and it would lead to the production of vegetables of superior quality. Cabbages range from five to twenty-five pounds each, and thus every housekeeper is called upon to be expert in judging of their weight, before she can buy with any certainty of getting value.

Rev. Mr. Carter, of Brooklyn.—There is only one side to this question. The food for the poor people in this city, New-York, is a very important consideration. They are defrauded greatly by the common way of measure of articles. The delicious article strawberries, so desired by all in their season, is one of those in

the measure of which the poor suffer. I speak of the many; the rich can take care of themselves, and they can afford to lose. I have seen the strawberry hucksters make four baskets out of three which they bought from country people. Speculators manage to impose on our people with their measures, barrels, &c., constantly. I have purchased potatoes by weight instead of measure. The average amount sold by the barrel is about two bushels and a half, and they weigh about sixty pounds a bushel. We can do good by following this matter up with energy. I hope that the frauds will be pointed out, and a plan adopted which will be just to buyers and sellers.

Mr. Robinson.—Sweet potatoes sell by the barrel. A buyer remarks, your barrel is not full. Stop, says the seller, I'll make them full. He shakes the barrel in such a way that they are full directly.

Mr. Groesbeck, of Brooklyn, presented bunches of Isabella grape nearly ripe, although they are the second crop this season on the same vines. Also, very good Japan pea plants, full of ripe peas.

Hon. Mr. Dissosway, of Staten Island, requested seeds and plants to be sent to President Roberts, of the Republic of Liberia. The Club desired that exchanges of seeds and plants should be made with that Republic. The Secretary prepared a package of Japan peas, and sent them by the last colony ship.

Messrs. Robinson and Mapes proposed to continue the subjects of the day at the next meeting. Adopted. (Viz.)

"Winter care of cold frames, winter management of manure, and the winter warming and ventilation of stables; and the preparation of fuel."

The Club then adjourned to Nov. 21, at noon.

H. MEIGS, *Secretary.*

November 21, 1854.

Present—Messrs. Geo. Bacon, Hon. Robert Swift Livingston, Prof. J. J. Mapes, Paul Stillman, Dr. Waterbury, Messrs. Waring, Vail, Lowe, Grifling, of Jersey, Dr. Church, Mr. Coleman, of Brooklyn, Peter B. Mead, Corresponding Secretary of the American Institute, Thomas B. Stillman, Mr. Tousey, Hon. R. S. Livingston, and others—forty members.

Hon. Robert Swift Livingston in the chair. Henry Meigs, Sec'y.

The Secretary read the following papers translated and prepared by him from the works received by the Institute since the last meeting, viz:

From Alexander Vattemare, Sept, 1854. Among a number of valuable works, the Institute has received from him, Guide de L'Apiculture, (Bee Keeper's Guide.) By M. Debeauvoys, member of many learned societies. Paris, 1851.

PHYSIOLOGY OF BEES.

1. Bees accumulate provisions in their hives, of various qualities for winter, for they are wide awake all that season; and the larvæ from the eggs continually laid by the queen in great numbers, are to be fed.

2. Authors have distinguished four kinds of bees, but only two kinds are well known. The first of these two is of a blackish color, of extra size, laborious, easily managed, but inferior to the second species. The second species, known by the name of *The Little Dutch Lady*, is smaller, of a yellowish, brown, reddish color, is lively, ardent, active in work, and good humored.

These two species are sometimes found in the same hive, but there are whole districts and countries where only one sort of them appears. Each swarm has a queen, and males and workmen of the same nature as the queen, but sterile on account of the education they receive. The queen alone has charge of laying the eggs, (for several consecutive years,) enough to sustain the number of the swarm, to supply the losses of life of the field workers.

4. Anciently the name of king bee was used, because her sex was then unknown.

5. Her development from the egg to her birth, is thus. The egg which is to produce her is deposited in a cell of peculiar form, entirely different from those of the common bees. Three days after the egg is deposited, a small worm comes out of it called a larva. It is seen upon a whitish kind of pulp, very abundant at the bottom of the cell. The worm appears to eat this. The worm grows little by little for five days, and then assumes the form of a little crescent; three days afterwards this crescent shuts up with its head downwards; it seems surprising that it does not fall. The nourishment it receives is very abundant, so that there always remains some after the birth of the queen. On the eighth day the bees close completely the cell with the worm in it. The worm then begins to spin a shell which will cover the head and corslet of the bee when she is hatched out, her belly remaining naked in the wax. On the eleventh day the larva assumes the form of a nymph or pupa, having now all the parts of the queen, and of remarkable whiteness. In a few days these parts harden, begin to have color, and after seventeen days and a half, she breaks the covering.

6. The young queen now out of her cradle, does not exhibit the characteristics so distinguishing which she subsequently assumes, and which she preserves until her fifth year. She becomes brown, short abdomen, more stocky than the workmen. Her head is larger than theirs. She is marked by larger feet and yellow.

This deep, yellow, or golden color is observed on pupas of two or three days old. After some weeks—above all, after a year—the queen has a slender figure; her abdomen, pretty well developed, is not covered by the wings until towards the third year. Her head appears smaller, her feet visibly larger, and the golden color now extends over her whole abdomen. Her feet are so impregnated with gold as to seem transparent; her sting, covered by her last ring, is not perpendicular to her body, but bends below in an angle.

At a certain age she loses these fine colors and the large form of her belly. In her fifth year her legs are still yellow, her body a little longer, but very black, her wings dry and fringed. Now wax makers are taken often to be old queens, so much are they like them. The belly of the queen diminishes in size much after laying male eggs, or when her laying is lessened by any cause whatever.

7th. Her longevity.—She lays few eggs in her fifth year, and she is said to live seven years.

8th. Her moral character.—She is called queen on account of her great influence over her children. When she goes out they all follow. If they want to emigrate, and she will not leave her lodgings, they all come back to her. She commands the swarm to go to where she pleases. If she cannot take wing, but is tormented with the necessity of founding a new colony, she walks along the ground to some place, with the bees all following wherever she goes.

9th. Her song.—Some days before her departure she sings a song quite like the grasshopper's. She repeats it frequently at intervals, while profound silence is kept in the hive.

Some bee raisers say that she sings only upon the departure of a second swarm. Others say it is owing to young queens, who are prisoners, demanding leave to quit their cells.

10. Her marriage.—In one day after her birth the young queen leaves the hive, glances into the air, where she couples with a mate, and in twenty-five to thirty minutes returns to the hive *fecundated for life*. Forty six hours after this marriage she begins to lay a countless progeny. During the first eleven months she lays none but workingmen's eggs, about sixty thousand a year. At the end of the eleven months she begins to lay eggs of males, and continues it for twenty or thirty days, and during this period she does not lay one worker's egg, but every three or four days she deposits a queen egg in a royal cell.

It is an old queen that always goes off in swarming.

This apiculture of M. Debeauvoys is a small duodecimo of 256 pages, with a nnmber of small woodcuts of bees, &c. Interesting and useful.

COURSE OF HORTICULTURE.

[By M. Poiteau. Paris, 1848.]

FROM ALEXANDER VATTEMARE.

A very accurate view in the least number of words.

On grafts.—He remarks that a bud of the Prime, whose wood is dark colored, grafted on almond, whose wood is white, *never darkens the almond wood below the graft.* The conclusion is that the graft sends nothing down. But the fibres of all woods are white, as white in ebony as in any white wood. We know that the coloring matter of vegetables is furnished only by the cellular tissue which always radiates across the fibres horizontally, while the fibres are always perpendicular, or near it, that is to say, the fibres are always parallel with the axis of the plant. The cellular tissue pierces the bark, and when the bark is torn off their ends are broken off. The coloring matter in this tissue neither ascends nor descends.

Vegetable is a producing apparatus. Animal a consuming apparatus.

M. Payen has given a bold idea, viz., that the azotised matter found in plants is animalized, and that great microscopic power may reveal that fact. That the fibre is merely a sheath within which animal life exists. This is consistent with my views and those of the astronomer, Lahire, two hundred years ago. (Note by H. Meigs, and with the vegetable theory of Theophrastus 2200 years ago.) Twenty years ago azote was hardly suspected of existence in vegetable matter. It was even supposed to mark a distinction between that and animal matter, the latter being abundantly supplied with it. To-day it is acknowleged that azote plays a principal part in vegetation, and is active in every part of the plant, although its name implies *without life.* According to our most able chemists, twelve molecules of carbon and ten molecules of water form ligneous tissue, cellular tissue, starch and dextrine, and diastase. Twelve molecules of carbon, and eleven of water, form crystallizable sugar.

Twelve molecules of carbon and fourteen of water form uncrystallizable sugar. Carbon cannot enter plants.

[Journal of the Society of Arts, London, April 7, 1854.]

PRESERVATION OF GRAIN AND GRAIN PRODUCERS.

Joseph in Egypt kept grain on hand, and probably the dry climate had much to do with its preservation. Possibly some of the mummy wheat of our day may have been of the identical grain hoarded by Joseph.

The want of efficient storage for grain, is one of the causes, not merely of fluctuation in price, but higher prices than if we could store it with the same certainty as timber and coal. Being made safe, there would be more dealers in it. There does not seem much difficulty if we can only divest ourselves of preconceived ideas—such as that a granary must have floors and windows more or less in altitude.

In England we put our flour in sacks. Brother Jonathan puts his in barrels, so that through the cracks and pores of his barrel he has a spoiled crust—musty—of nearly an inch thick on the flour next the heads and staves, and sometimes the whole mass. When Brother Jonathan wants to keep his flour or crackers undamaged, he makes them thoroughly cool and dry, and hermetically seals them in tin cans. So the Chinese line their tea boxes with metal. In all cases, the object is to exclude air and vermin. We preserve meat, fruit &c., in hermetically sealed metal cases. The question, also, is one of expense. Let us examine this. We use canisters. Why not put grain in iron canisters, large enough for the farmer to put his crops in, or the grain dealer to hold his stock—the interior galvanized, to prevent rust, and the outside also, if desirable. These large canisters may be mounted so as to be moveable from place to place. They should be hermetically tight, having only a man-hole to enter by, and that stopped air tight. In such canisters, wheat put in free from vermin would keep sound for any number of years. But an additional advantage would be an air pump; all vermin casually in it would be killed, and the same pump might be used to draw warm air through the mass to remove all moisture. As these canisters

must be air and water tight, they can be kept in cellars, or buried in the ground with perfect safety. Grain could be poured in and then drawn out at will by the Archimedian screw. When the canisters are buried, the wagons of grain are drove over them and readily emptied. Such granaries may be so situated as to accommodate many farms. These canisters may be divided into compartments, with locks, seals, &c., for the different owners of the grain, safe from vermin, wet, fire and thief.

W. BRIDGES ADAMS.

Prof. Mapes.—The melon bug is observed to fly around and about the box placed over a plant, but cannot generally manage to fly into it, so that for the most part our former box coverings of net work, or of glass, are unnecessary, and the grubs cannot get into the box. Scatter some salt about the outside of the box, and the grubs which reach it are killed by the salt.

Judge Livingston.—We have found useful to save our melons, lime and gypsum, mixed half and half, pulverized and sifted over the melon plants.

Mr. Paul Stillman.—Snuff and charcoal, mixed, are recommended to be sprinkled on the plants.

The Chairman called up the question of the day (viz.): "Winter management of cold frames, winter warming and ventilation of stables, and preparation of fuel."

Mr. Paul Stillman read a letter from a friend in California, inquiring how the seeds of water melons succeeded (which he had sent him from melons that weighed sixty pounds each). Mr. S. stated, that he lost all his vines by striped bugs, which, contrary to all theory, attacked his vines after they were loaded with fruit, and by eating the leaves destroyed the whole vines. They did the same thing to his bearing cucumber vines, in September; and he wants to know how to prevent a repetition of their ravages.

Prof. Mapes. I have never known such old vines attacked. I keep bugs off young vines by a simple four-sided box, ten inches square and ten inches high. There is no need of glass or cloth over the top.

The Chairman.—I have saved my vines by dusting them with air-slacked lime and plaster, mixed in equal quanties.

Prof. Mapes.—A dusting of snuff or charcoal dust is generally effectual.

Mr. Stillman.—I tried that, but it did no good. I only stopped the ravages of the bugs by pulling up the vines and throwing them, bugs and all, into the fire.

The subject for the first Tuesday of December is, "the best manner of preparing fuel, including the proper time to cut it, and wood compared with coal;" and also, "the best manner of constructing an ice-house."

Prof. Mapes on the subject of cold frames, said: This subject is pretty generally understood, but there may be some members present not accustomed to the use of cold frames in the place of hot beds.

It is usual in the spring to raise cabbage, cauliflower, and other plants, in hot beds, but when these are started very early, it is difficult to take care of the beds, as too much heat will destroy the plants, and even an ordinary quantity will very often give a weakly plant.

The market gardeners now pursue a different course—they use cold frames; these have no glasses, and are made of a board twelve inches high along the rear of the frame, and three inches high in front.

The plants are raised from the seed in the fall or late summer. When three inches high, they are pricked out in these cold frames, where they are covered during the winter with shutters without glass. The object of these shutters is not to prevent them from freezing, for that you cannot prevent, but it is to prevent frequent freezings and thawings. When the weather is mild, and the plants are not frozen, the shutters are removed to give air and to prevent their damping off. These plants may be put out in early spring without any fear of being injured by frost. I have had plants

covered with three or four inches of snow after having been set out, to grow without receiving injury, while hot-bed plants would have been destroyed. Cabbages so treated, will be ready for market one month earlier than those from hot-beds, and are less liable to become clump rooted when raised from good seed. In these cold frames, by the plants being placed at equal distances apart, they have an opportunity of doing well, instead of spindling, as when crowded in hot-beds.

Market gardeners understand the value of these cold frame plants so well, that they will pay for them one dollar a hundred in early spring, in preference to paying eighteen cents for hot-bed plants.

The same plan may be used for summer cauliflowers, and even broccoli, which is a great advantage. We all know that cauliflowers will not give full flower in very hot weather; but with very early cold frame plants we may have early summer cauliflowers, and therefore we are compelled to raise them at such dates as will cause their heading to either precede or occur after the hottest weather.

With the cold frames, we may raise plants from many seeds, that we cannot succeed with in hot-beds or ordinary out-door culture. For instance, if rhubarb seed be sown in the spring, it cannot withstand the hot sun, and therefore but few plants ever arrive at maturity, so as to be able to put them in place; but in cold frames, letting them get up before the winter, every seed will germinate, and by being covered with shutters every plant may be preserved during winter. In the spring these plants will be ready for use; indeed, you may succeed pretty well by raising the plants from the seed out-doors in the fall, and by covering with brush, may shade and prevent sudden thawing during winter. The plants generally will be found lying on the surface of the ground in spring, having been thrown out by the frost during winter, and they must be dibbled in; not so with those raised in the cold frames.

It is well known that rhubarb plants have been sold by nurserymen at very high prices; two and three cents an eye have been

common prices. A root will often give thirty eyes. These young roots raised in cold frames, are more perfect than the cut or divided roots of old plants, and produce better results. It is true that the seeds of the best rhubarb, say Myatt's Linnæus and the Victoria, will give two kinds, the smaller of which is so much earlier, as to be more valuable, from the higher price of the product early in the season.

H. C. Vail.—I would state that many farmers occupying the light sandy soils of Long Island, and Monmouth Co., New Jersey, are in the habit of throwing up ridges from nine to twelve inches high, running east and west, thus protecting the south side from the cold northern winds. Cabbage, and other plants, are set on the warm side of the ridges, and protected by a mulch of salt hay, straw, or other refuse litter. Even without making ridges, and by the use of the mulch alone, plants are started in September, kept through winter, and commence growing in early spring. This plan may, and probably will, be adopted by many who cannot afford to construct regular cold frames.

VENTILATION OF STABLES.

Prof. Mapes.—There are a few features connected with the ventilation of stables, which are very important.

In the first place, we all know that the process of digestion is but a slow process of combustion, and the same thing takes place in the stomach of the animal, but progresses more slowly than in a stove. It must be evident, therefore, that if a stable be too cold, a larger amount of food will be consumed by animals to produce the necessary amount of heat, nor can you produce excessive heat and at the same time obtain a large amount of flesh; therefore, a stable of the right temperature, will enable you to winter your cattle at a less expense, from their consuming a less amount of food.

Now as to the necessity of ventilation apart from warming. We are all aware that a man renders twelve gallons of air per minute incapable of sustaining life, for the products of decomposition during this space of time, will surcharge the air with too

much carbonic acid. This is true of other animals, as well as man. This may be clearly understood, by stating the fact that not only do we do it by breathing, but the surface of the body of an animal gives off these gases. When an animal is on the top of a mountain, these gases can fall off readily, and new portions of air approach the surface of its body, but when the surrounding atmosphere is about the same weight, the animal suffers by the proximity of these gases; and therefore an ox enclosed in a varnished silken bag, with his head exposed, will die in twenty-four hours. This experiment was tried long ago, and published many times. Thus it is evident that the amount of air passing into the stable and out of it, should be equal to the amount required for the respiration of that animal without repeating his former breathings; and the admission of this air should be so regulated as not to give draughts, but it should be diffused through many openings, and passed off in the same way. It is for these reasons that proper ventilation is necessary.

The style of box feeding so highly recommended by some, I believe to be deleterious, and I think it has been sustained by experiment. So far as economy of manures, it is already settled that larger results can be obtained by such practice, than by leaving the manure under the animal, as in the box feeding system. It is true the compacting of the manure prevents a very rapid decomposition and evolving of the deleterious gases, but still they are evolved, and it is necessary to let in a much larger amount of air to ventilate a stable when box feeding is pursued.

Now as to the construction of stables, much may be done to retain the heat. Thus double boarding will give a confined space of air, which is the best non-conductor of heat, hence the sheathing on the inside, as well as the outside of the frame, produces a warm stable.

There are many substances that may be used in stables capable of absorbing manures, that will absorb gases Among these may be enumerated, charcoal dust, decomposed muck, plaster of paris. Slight sprinkling of very dilute sulphuric acid on the ground where a floor is not used, will change the ammonia to sulphate of

ammonia, and thus prevent it from occupying the surrounding atmosphere and being deleterious to cattle, but in a majority of stables, when the door is opened, the strong smell of ammonia is such as to cause a person's eyes to be irritated, and so with the eyes of the animal in the stable.

Young and growing animals cannot assume a healthy organism while breathing impure and improper air, nor can the milk of animals fed in badly ventilated stables, be as healthy an aliment as under more propitious circumstances for its development.

Apart from this argument, which should be entirely sufficient to induce the farmer to pay strict attention to the ventilation of his stables, the cruelty of confining animals to buildings badly ventilated may be named; and when it is taken into account, that the use of proper disinfecting materials, in addition to the ordinary means for ventilation, would increase the amount of fertilizing material, as well as protecting animals from disease, it seems worse than stupid to leave these well understood truths neglected.

Mr. H. C. Vail said—Mr. Chairman, in regard to the practice of providing warm, well ventilated stables, I can only say that the experience of my father and myself, extending over many years, has proved it to be the most cleanly, healthy, and economical method which can be adopted. The cattle were divided into three or four parcels—one lot of fourteen being confined in a large, well ventilated stable, so constructed as to be readily cleansed. Feeding troughs were arranged in such a manner as to allow the animal to rise up and lie down easily, and permit the removal of the refuse food. Plaster and other deodorizers were used more frequently than in the other stables. The health of the animals was better, the manure superior in quality and greater in quantity than that made by the cattle running at large in the open yard, while they gave larger returns of milk, of a richer quality, and fattened more easily. The amount of food required to maintain this condition was less than what was required for animals confined in the stables badly ventilated by strong currents of cold air, or of those cattle kept in the open yard. Indeed, it would be impossible to maintain the same conditions with

the latter at any reasonable expenditure for food. You must bear in mind the fact that I allude to well ventilated and thoroughly cleansed stables alone, for I am well aware that many animals are placed in stables of such a character, as to impair rather than improve their health.

With regard to theory, Mr. Chairman, we all know that there is a mysticism thrown around the various functions of the animal body. From the time of Paracelsus, who shed so much light on the science of medicine, until the present day, man has regarded the animal economy with more or less of a mysterious feeling. The terms vitality and vital functions have been freely used to explain all we did not understand—to cloak our want of knowledge. But, sir, at the present day, through the instrumentality of some of the most powerful minds of the age, among whom Liebig stands in the foremost ranks, we are beginning to solve these mysteries and to comprehend their actions. Thus, to begin at first principles, we know that the animal body is derived from the food consumed, that no animal possesses the power of sustaining itself, or of increasing its mass, by combining the inorganic elements of earth and air. No, this is the office of plants, which furnish three classes of food to the animal system. The starch, gum, sugar, &c., or compounds containing only carbon or charcoal, oxygen and hydrogen, or water. The gluten, albumen, zeine, &c , containing, in addition to the above, nitrogen as a constituent. The ash, or mineral matter of the plant, which go to form bone, and the inorganic basis of flesh and blood. Close investigation and oft repeated experiment have proved that the first class of bodies are the elements of respiration, or in other words, that they go to form fatty substances which cover all the tissues of the body, and that as oxygen is taken into the lungs, passes into the blood, and thence courses through the body, it comes in contact with the fat, combining with its carbon to form carbonic acid, and with its hydrogen to form water, at the same time giving off heat; in this impure state the blood returns to the lungs, and these bodies are thrown off.

The second class of bodies, those containing nitrogen, go to orm organized tissue, and do not form fat, but produce force upon

decomposition in place, the same as the fatty matters produced heat. Thus the mere vegetative life of the animal is building up the system from the plants it feeds upon, while the powers of locomotion and superior animal life require that decomposition should take place to give force for motion, and heat to sustain animal temperature. The digestion of food in the stomach, as well as its passage through the intestines, also eliminates heat. Heat, then, is necessary to animal life If animals lose heat by exposure to currents of air, to the constant evaporation of moisture from rains and snows deposited upon their bodies, and, as I have just shown that this heat is derived originally from food consumed, it follows, that in order to render the animal healthy, to secure larger returns in the form of milk or increase of flesh, it becomes necessary io provide conditions which, while it maintains these essential requirements of animal existence, shall be done at the least expenditure of food. This can only be accomplished by providing what the best farmers, both in England and America have discovered to be the most profitable, viz., warm, well ventilated stables.

Mr. Solon Robinson—Many of the horses in this city are kept in dark cellars, and constantly breed disease by want of light and air, and the ammonia arising from the floor. It is a common practice of livery stables to put horses kept by the month in a cellar, where each horse has not a breathing hole twelve inches square, and scarcely a ray of light, and no exercise except walking a few feet to water. In the stables of some laborers who keep but a single horse it is still worse, for at night they are shut up in their cubby holes or cellars, almost air tight, and the stables are kept more unclean than the public stables Horses are often stabled upon floors one above another. It is difficult to say which tier is worst off, since the gas from the cellar rises to those above. On the corner of Grand and Mercer streets, a large church has been turned into a horse stable. I don't know how much pure and undefiled religion dwelt there when it was used for a place of worship; I do know that those who stable horses in unventilated stables, like the basement of that church have no mercy. "A merciful man is merciful to his beast."

In Twenty-fourth street an average of 500 horses is kept in stables upon two blocks for sale. The stables are mostly above ground, yet those who use them are constantly in dread of an opthalmic disease, called the pink eye, which attacks horses from the country, and injures their sale. It arises from the excess of ammonia, and want of ventilation and light. If the floors were kept white with plaster the disease would disappear. Disenfectors are scarcely ever used here in the city, where most needed. Stables cannot be made too light, or with too much ventilation. The government of this city should prohibit the stabling of horses in cellars—it is a cruelty to animals, and a nuisance to people ten times greater than city cemeteries. It is a much needed reform, that a reform Common Council may very well busy themselves about. The use of one dollar's worth of plaster, copperas, sulphuric acid, or charcoal, all easily obtainable in the city, would often save one hundred times the cost, in preventing sickness, or saving the lives of horses. Shall we ever learn to do anything that our grandfathers did not do.

Dr. Waterbury has composed the following table, in connection with the matter of stabling animals. If we take from the carbon of different kinds of food the excess of oxygen atoms over hydrogen atoms; allowing two atoms of oxygen to one of carbon, there will still remain an excess of carbon to be used in the system for the production of animal heat. If we designate the carbon heat and the azote motion it will stand in this way:

Beef steak,	1 lb.	motion,	3 lbs.	heat.
Oats,	1	do	16	do
Hay,	1	do	18	do

These items may be regarded as types of the food of the two classes of animals, the carnivorous and the herbivorous, and this table is sufficiently exact for purposes of illustration.

Is there any connection between the differences of their items and the habits of the animals that feed on them?

Observation has shown us, that animals cannot use the one of these elements of life, without disposing of a corresponding amount of the other. Stage horses, hard driven, grow poor, though the

weather be warm; and animals, that are thin in flesh below a certain point, are always weak.

The first item, "Beef steak," represents very fairly the food of the carnivora. Their game is lean and contains very little fat, and this condition is connected with their roving habits. They are continually moving to keep warm. For every three pounds of warmth they use, they must work off one pound of motion. In compensation they have been assigned to warm latitudes and clothed in furs. Cats and dogs are very sensitive to cold; they never lie down to take a nap in a cold place, and if they were tied in a stable and could be kept as still as cattle in cold weather, they would be chilled to death. The temperature of the carnivorous animals never rises high enough to produce sensible sweating, and their skins are said to have no pores.

The second item, "Oats," may be taken in the type of the food of a well fed and steadily worked horse. We notice the vast difference in the heat producing qualities (from 3 to 16), and we conclude, that the horse will be under the necessity of stirring less, to keep warm; that the herbivorous are more sluggish in their habits; that they are better adapted to stabling.

The third item, "Hay," may be taken as the type of the condition of a hay fed horse, soft in flesh and not fit for labor. For every pound of nitrogenized matters that he uses in motion, he must dispose of a corresponding surplus of carbonaceous matters, and that is, he must sweat off so much fat. Now, sweat is as all old yonkers believe, a waste of fat, and if we could succeed in bringing the good of a horse to such perfection, that he should not sweat, we should have reached the ideal of economy. The formula for beef steak is, that "ne plus ultra;" but, unfortunately, the horse's machinery can never be adopted to that kind of food. His wood stove can not burn coal.

When we remember that the difference between a hay fed and a grain fed horse lies in the difference between the second and third formulas (18 to 16), we conclude, that the gap between the second and the first (16 to 3), is too great for the limits of species, and that the mythological flesh eating horses are fabrications of

fancy, to be assigned to a place with the fabulous Centaurus. So, when science breathes upon it, the frost work of fancy becomes but drops of water.

But when cattle are hid in a stable, the reverse of all this is equally true. If they cannot take exercise, the stable must be made warm. If they are left to shiver in open stalls, it is true that the temperature of their bodies remains at blood heat, for life cannot vary far from this point, but the corresponding sixteenth of nitrogenized matters accumulates somewhere in an inflammation; that is, they take cold.

If a horse is confined to the stable and fed what grain he will eat, and given what water he will drink from a pail, in a little while he becomes diseased, stiff in his joints, he has got the gout or the rheumatism, or something else, from high living or deficiency of exercise.

If supplied with a choice of food, oats, hay, buckwheat, carrots, salt, and water, the instinct of the horse will direct him as the same faculty does man, to the kind of food, best calculated to supply the waste of his system.

From these considerations we see why some of the best stock growers prefer to allow colts to run in the yard, and why turning grain damaged horses out on the dung heap, has been a favorite idea with farmers. It is true, that large framed and more powerful animals may be raised in this manner, although at a greater expense.

Not only should the stable be warm, but it must be light. The eyes of horses bathed in a solution of ammonia, and kept in darkness, are in just the condition to take on inflammation, when suddenly brought out into the dust and wind and glare of the sun, and irritated by the increase of circulation, incident to a drive. Little attention is frequently paid to the inflammation, if it is even noticed, and, instead of being put on hay feed, and allowed to rest, the horse is driven until the deposition of fibrin gives the eye a milky appearance, which is popularly believed to be a "film," a kind of skin that must be got off, by blowing some-

thing through a quill into the eye. Even now, if the eye could be let alone, nature would yet absorb after a while the white deposit, and vision would be restored; but the inevitable quill puts the matter in a few weeks beyond the power of reparation.

Gentlemen horse doctors! you that saw fit to bleed a horse, that had just performed one hundred miles in ten consecutive hours, in order to rest him, pray put up your fleams and pocket your eye quills, until this enquiry shall be directed by *some* theory—you are quite too practical.

The following questions were adopted for the next meeting of the Club, viz: "Cooking food for hogs." "Cutting and steaming food for cattle." "Building of Ice-houses." "Use of salt in agriculture." "Use of lime in agriculture." "Washing fruit trees with alkaline washes."

Judge Livingston presented from his farm on the Hudson, a new pear, without a name, and requested the Club to name it. It is small, very round, and of very high rich taste. Many intelligent members deemed it fit for the first class for fine flavor. The tree is of moderate size, some five or six inches diameter, 30 years old, grows a fine head with but little pruning. Also his Beurré D'Aremberg pears, and his peculiar Snow apple, so called because it hangs on the trees until snow falls; a small, yellow, very well flavored apple.

The Club adjourned to Tuesday, December 5th, at noon.

H. MEIGS, *Secretary.*

December 5, 1854.

Present—Messrs. Hon. Robert Swift Livingston, C. I. S. Goodrich, U. S. Consul at Lyons, France, Dr. Wellington, Dr. Waterbury, Dr. Edgar Peck, and Mr. Chester Coleman, of Brooklyn, Prof. James J. Mapes, Solon Robinson, Esq., Col. Travers, of Osceola Point, New Jersey, James De Peyster, George Bacon, George B Rapelye, E. R. Crouch, Esq., Civil Engineer, of England, Mr. Vail, and others, between thirty and forty members in all.

Hon. R. S. Livingston in the chair. Henry Meigs, Secretary.

The Secretary read the following papers, translated or selected by him, viz:

SOYER'S GOOD COOKERY FOR POOR FOLKS.

The London Athenæum for September, 1854, contains a useful paper showing M. Soyer's efforts in that matter.

He recommends nettles, which can be had for nothing, and following his directions, when cooked, are as good as spinach. He says that the plainest dishes can be made (with economy) to savour of the richest dishes. The great Duchess of Marlborough owed some of her power over the great duke, her husband, to the daintiness of the dishes of omelette which she cooked for him.

Talleyrand is said to have remarked that England had *one hundred and twenty religions*, but only one sauce, and that was melted butter! It is supposed to have been said long before the time of the cunning Bishop of Autun, by one who added, that there was in England *nothing polished* but steel, and her only ripe fruit was "*baked apples!*" Mr. Soyer gravely (gravyly) says, that he was near the truth, but that he should have told, at the same time, how to engraft 119 sauces upon the original one. It is a fact, that with our *one sauce*, *butter*, we often spoil both our dinner and stomach, and offend other senses besides. It reminds of Queen Elizabeth's remark on the anointing at her coronation. "The oil is grease, and smells nasty."

Soyer insists that we must begin our good eating of meats by proper methods of rearing animals. He was horror struck with the nastiness of the pig pen. Hogs should be washed as clean as a lady, and kept so, to be good meat, and wholesome too.

Sam. Patrick, in his edition of the Colloquies of Erasmus, says, "Omnes fere gentes Europeanæ præter nos, lavant manus antequam discumbunt"

Almost all European nations (except us) wash their hands before they sit down to dinner, so that only eighty years ago we were *self acknowledged*, the *dirty nation.*

[United States Patent Office Report. Part 2, 1853.]

We extract from this valuable collection of facts in agriculture, many interesting ones.

OATS.

When considered in connection with the artificial grasses, and the nourishment and improvement it affords to live stock, may be regarded as one of the most important crops we produce.

Its history is highly interesting, from the circumstance, that, while in many portions of Europe, when ground into meal, it forms an important aliment for man, one variety, at least, has been cultivated from the days of Pliny, on account of its "superior fitness as an article of diet for the sick."

The country of its origin is veiled in the same uncertainty as that of barley and rye, though the most common variety is said to be indigenous to the Isle of Juan Fernandez, while another sort, resembling it, is found growing wild in California. But as these are met with in places which have been cultivated at former periods, it is probable that they are only outcast and not wild aborigenes.

Oats were introduced in the North American Colonies, soon after their first settlement by Europeans. They were sown by Gosnold, on the Elizabeth Islands, in 1602; cultivated in Newfoundland, in 1622, and in Massachusetts in 1629. In 1633, good crops of oats were grown in Lynn. It appears that they were not much cultivated previous to that time, as four hogsheads of oatmeal came to Nantasket, from England, in 1631. This grain was introduced into New Netherland, prior to 1626, as there arrived in Holland from the little colony on Manhattan Island (New-York), samples of the recent harvest, consisting of oats and other grains, as an evidence of their prosperous condition.

The oats of the United States for 1853, amount to 160 millions of bushels, of the value of 60 million of dollars, at 37½ cts. p. bsh.

Oats are generally sown upon the poorest and most exhausted land of the farm. On a first rate soil, in good condition, they sometimes produce *one hundred bushels per acre*, more than double or common good crop.

THE BROWN CORN.

John Brown, senior, of Long Island, near Lake Village, Lake Winnipisiogee, New Hamphire, states, that the island he is upon, is in latitude 43° 40′ North, and contains about 1100 acres, the largest part of which is in good arable land, the remainder pasture and wood. Soil a brownish yellow loam, which, well tilled, becomes warm and retentive of manures. Subsoil, bright yellow, underlaid by a hard pan of varying depth and thickness. The Brown corn grown on one acre of it; highly cultivated, produced 130 bushels per acre.

My rotation of crops for the last thirty years, generally, has been, 1st potatoes, 2d Indian corn, 3d wheat, and then grass, mowed till "bound out," say 6 to 7 years.

I have made a profit of one hundred dollars an acre on Indian corn, sold at one dollar, per bushel.

[La Patrie. Paris, Monday, Oct. 30, 1854. Presented by Dr. J. G. Adams, late from Paris.]

ACADEMY OF SCIENCES.—SILK-WORMS.

At the recent sessions of the Academy, were read several interesting communications on this subject, the Bombyx Cynthia, of which we have already spoken, has been raised for a long time past in the East Indies and in China, and has lately been naturalized in Italy; it may be naturalized in France. This insect presents important advantages; it flourishes upon leaves of the castor oil plant, which grows everywhere readily in moderate climates; it also feeds well upon leaves of the willow and lettuce.

The mulberry silk-worm gives but one generation a year, while the cynthia complete one in forty three days; it is more robust; it is sick during its four mouldings, but each of these lasts but 24 hours, at most. Its silk has considerable hardness and solidity, but it is not yet very certain that it is capable of division. For a complete understanding of this point, some details as to their cocoons is necessary. The silkworm has this peculiarity, that it creates the material to build its house with, which it dwells in

for some time. Nature has given it complicated organs. The lower part of this worm, both front and rear, exhibits on each side of its intestinal canal, a succession of tubes. The first of which is called the slender tube (tube grêle) is twisted a great many times zigzag, without apparent order; the second is enlarged like a reservoir; the third, which is very narrow, is called the drawing frame (la filière). The two drawing frames unite at a sharp angle at the median line, in one single tube, which, after a short space, terminates in the lower lip of the animal in the form of a short proboscis, which is extended or contracted at the will of the worm; its orifice enlarging and contracting at its pleasure. It is surmounted by two little appendages, called feelers.

The silky matter is secreted by the slender tube, and accumulates little by little in the reservoir, where we find it in the form of a thick gelatinous fluid, which becomes solidified and moulded at the drawing frames; the two threads glued together and united in one come out of the proboscis. As to the feelers above the proboscis they are its organs of touch and exploration, and they direct the animal in making his edifice, displaying and disposing his delicate filaments in all directions, it represents the spinning and drawing process at the same time.

Every cocoon is constituted by a single thread, of which the different parts are united by means of a viscious (sticky) matter, which he uses as cement. A thread from three thousand to four or five thousand feet long is conical in shape, and very slender when examined interiorly. To form its cocoon this bombyx first builds with very strong threads a kind of scaffolding quite thick, in which it incloses itself, then bends itself in the shape of a horse-shoe, it continues to make all around it a silky bed, of which the filaments, very short, are made zigzag by its proboscis. With its feelers and fore feet it shapes it as it dries and hardens. When he has thus built a part of his edifice he builds another like it at the other end. It requires his indefatigable constant active labor for seventy-two hours to finish his home. Not one moment of relaxation. It is calculated that in this work his head makes three hundred thousand movements—a little more than

one every second. Each cocoon is made with one single uninterrupted thread, composed of four *elements* within and without.

[From the same.]

GRAPE MALADY.

A gardener by the name of Gourdel, after having employed, without success worth notice, all the prescriptions for cure and prevention, such as sulphur, lime, tobacco, &c., took a notion to try sea salt, and has obtained the best results, as Mr. Gandry attests. A half pound of sea salt dissolved in three quarts (litres) of water, applied by means of a brush, or better, a bunch of feathers, to the bunches of grapes. A few cents worth will be sufficient for more than a thousand bunches. The grapes only are to be moistened in this way, the grape leaves are damaged by it.

PORTRAITS WOVEN IN SILK.

Mr. C. S. Goodrich, Consul in the city of Lyons, France, gave an account of the Jacquard loom, invented by Jacquard, a native of Lyons. Upon this loom, by some late improvements, portraits are made of silk in the most beautiful manner, so as to be a perfect fac-simile of the original engraving. The time employed in making one of these portraits varies from 12 to 18 months, at an expense of 25,000 to 100,000 francs. The silk filament is made to pass through a great number of pasteboard cards, from 20,000 to 30,000. The artists are now engaged upon a portrait of Washington. The expense of duplicates is not so great, but still it is beyond the reach of ordinary persons. They have only been manufactured upon a limited scale as valuable presents, and to show the perfection of this branch of mechanic arts. Specimens may be seen at the rooms of the American Institute. The length of time required to finish a picture is because the work can only be done when the atmosphere is in a peculiar condition.

Prof. Mapes gave an account of the improvements made by Winslow, of Massachusetts, in the Jacquard loom, and of the manner of using these perforated cards in weaving figures. The Lowell carpet works use looms made upon this principle.

FRENCH WINE STATISTICS.

Mr. Goodrich furnished the following statistics upon the vine-culture in France:

Nearly 5,000,000 acres of land are employed in the cultivation of the vine in France, from which is made annually 900,000,000 gallons of wine. The average value is 15 cents a gallon. The French wines have doubled or trebled in value within the past two years. Average annual total value of the wine crop, a fraction less than $100,000,000.

Exports.—50,000,000 gallons are annually exported. The south western and south eastern districts of France are the most productive.

Brandy.—12,000,000 gallons of brandy are annually exported.

Excise.—The excise duty on wines and their distillations in 1853 was $235,000.

Laborers.—The number of persons employed in the cultivation of the vine and manufacture of wine is a fraction short of 2,000,000, and 240,000 persons are engaged in selling wine. Most of the wine lands are untillable, sterile and hilly. The wine culture does not average a return of more than 1½ per cent annually.

Disease.—The disease of the vine is pretty general throughout France, though the southern section suffers most. This disease has prevailed for three or four years, and threatens to destroy the business.

ADULTERATED BRANDY.

Prof. Mapes also stated nearly all the French brandy now imported is made of four-fifths beet root rum, and one fifth grape brandy. The fashion use to be to import the brandy and mix it here with cheap liquor, but the French have taken the wind out of our sails. The Professor said there was a mistake about old brandy being healthy; the liquor least deleterious to the human stomach is pure spirit. He had tried all kinds enough, he thought, to constitute him a judge.

Mr. Goodrich said that all the cheap liquor now being exported to France will come back real French brandy.

Prof. Mapes gave a learned disquisition on the same subject, in which he adverted to the process resorted to by our wholesale grocers of making "genuine brandy," which was manufactured from "old rye," rum, and cogniac brandy, run through different worms, fresh made and fresh ground charcoal, into a common receptacle, and formed what liquor dealers call the "pure spirits," which, added the Professor, is, if a man does drink at all, the most constitutional, as it is divested of those noxious oils which prevail to a greater extent in the purest cogniac than in other liquors. He also stated the interesting fact, that what we receive here as "pure olive oil" is nothing more nor less than the surplus lard sent by our western pork merchants to France, where the transformation takes place.

Since the failure of the grape crop in France, the brandy makers have been driven to various shifts to obtain the raw material, and for the last three years large quantities of the results of their beet root, used in the making of sugar, has been distilled into a species of rum, which by being passed through pulverized charcoal, is robbed of its oils, and thus rendered a neutral spirit known in this country as pure spirit. It is colorless, and without smell or taste, except the peculiar biting property which is common to alcohol of all kinds.

The French brandy maker, instead of sending us the pure brandy distilled from the grape, has given us a compound made of a few gallons of cogniac brandy added to some ten times its bulk of this beet root spirit.

The foreign demand for brandy, however, has become so great, that even this supply has proved inadequate, and thousands of gallons of pure spirit made from corn and rye, are now being shipped from this country, for the use of the French brandy maker.

Charcoal with us is so much cheaper than in France that our distillers are enabled to make pure spirit, pay the freight to

France, and then undersell the French manufacturers in their own markets. This operation of pure spirit making may thus be understood. Suppose twelve leach tubs, each filled with pulverized charcoal, and each supplied on its top with a different kind of liquor, say if you please, on one, French brandy; on another, Jamaica rum; on a third, rye whisky, and so on. After this liquor has passed through the charcoal, it will run out at the bottom of all the tubs alike, the charcoal abstracting all the oil, color, &c., and producing a neutral spirit composed of alcohol alone. Thus, it will be readily understood, that the French brandy maker, who has a small quantity of brandy of high flavor, can duplicate the quantity many times by the use of pure spirits, and however sorry brandy drinkers may be that the quality of their favorite beverage is to be materially injured, at least as to its amount of flavor, or, however repugnant the conversion of large amounts of grain into alcohol may be to the advocates of temperance, still these will not alter the fact that the increased demand of corn and rye for this increased manufacture, will materially affect our markets, and secure to our farmers a large price for their products. Thirty millions of gallons of wine have been annually made into brandy, and more than half this quantity will now be required in the form of pure spirits made from American grain.

Dr. Waterbury could not allow this subject to pass without calling attention to the fact that the use of alcoholic liquors, which had been for some time opposed strenuously on *moral* grounds by a most respectable portion of society, was coming to be opposed for *scientific* reasons.

The existence of alcohol in the blood from absorbtion into the veins after drinking it, cannot be disputed. It has been obtained by distillation from the brain of spirit drinkers. Blood drawn from the arm of a drunken man had on one occasion retained a strong smell of gin after standing for twenty-four hours. It is by dissolving in the blood, and thus acting upon the tissues of the brain, that alcohol and chloroform and ether, whether they are inhaled or imbibed, produce intoxication. The natural diluent of

the blood is water. By means of it, the various actions of the different parts of the body are accomplished. Deprived of moisture, animal substance is as permanent as granite. The bodies of animals are in a continual state of decay during life, and this condition is essential to health. The condition of growth is equally connected with a pure condition of the vital current.

It does not follow that because the sensations produced by adulterating the blood with these foreign substances are pleasant, that such practices are healthful, or even innocent. The internal nerves of sensation were intended to answer to blood diluted with water. Fermented products are no where in the animal or vegetable kingdom found in the healthy bodies of living things. Alcohol in any shape forms no part of the sap in plants or of the blood in animals.

Now, as the nerves of special sense, (as of hearing, of seeing, of taste, or even of motion,) injured, give no sensation of pain, so the sensations produced by the action of blood adulterated with alcohol may be agreeable, and yet drinking practices may be, as experience proves that they are, destructive of health. Although it has been customary to exclude alcoholic drinks from the azotic group of elements of nutrition, we have been in the habit of assigning them a place with starch, gum, and sugar, as heat producing agents. It is true that they may be oxidised in the system. There is a rule among physicians, that in the last stages of disease stimulants may be given, if they *do not quicken the motion of the heart*, and it has been noticed that at such times it is difficult to produce intoxication. There is a very general notion in community that liquor warms a man, and there is no doubt but it does. Alcohol is more inflammable than those carbonaceous matters that are provided by nature for fuel in the systems of animals. It usurps to itself their place, and is consumed in their stead, while they are driven to the liver, and cause the liver complaint that spirit drinkers are so generally found to possess. This "liver complaint" is the same that visits those inhabitants of northern climates who continue northern eating habits in a southern climate, and there is a beautiful connection between the respective causes.

From the fact that the smell of alcohol in the breath of drinkers is different from the smell of its vapor, we are to conclude that it does always undergo some chemical changes of a destructive nature in the system; but the fact that it throws the natural heat producing materials unoxidised upon the liver, justifies us in excluding it from the class of non-azotized articles of food, and assigning it to the same class with chloroform and ether.

These substances are secondary arrangements of the natural elements of plants—they exist no where in the round of nature, and consequently our appetites and senses are not adapted to them. As our reason is the power by which they exist, so it is the only correct judge of their use. If alcohol were removed from the control of our tastes and inclinations, and subjected to the dictates of reason, there would be very little of it used. No matter if diluted, it still coagulates, as heat does its equivalent of albumen in the tissues of the brain and nerves, and attacks these parts first because they are richest in albumenous materials.

Experience has shown that intoxicating liquors are peculiarly destructive to the aborigines of this country. These Indians are the most carniverous of men; living by the chase, the constituents of their food are most rich in nitrogen, and to this kind of food their systems are adapted. The change to the ordinary food of civilized nations is almost too much for them, and we can easily see how going to the zero of the azotic scale, as an Indian does in a drunken debauch, and remaining thus for days together, is very apt to prove fatal to him.

As men have found in practice that a stove should be differently constructed for burning wood than for burning coal, so an Indian's body is best adapted for his kind of food. To continue the illustration, if men were to wet the fuel in either kind of stove with camphene, it is probable that the iron would soon be burnt out; at any rate, such is the effect of alcohol, *i. e.*, stimulants on our furnaces.

Alcohol contains, then, not a particle of nitrogen, not one atom of support for motion. Its heat producing power is vicarious,

leaving the natural heat producing material to be disposed of by the liver. The habit of using it may be readily induced in most people, and once induced leads to disease and death. For such reasons as these, upwards of two thousand English physicians have lately said:

"That total and universal abstinence from alcoholic beverages of all sorts would greatly contribute to the health, the prosperity, the morality, and the happiness of the human race."

COOKING FOOD FOR ANIMALS.

Professor Mapes—Raw food is not in condition to be approximated to the tenures of animal life. The experiment often tried has proved that eighteen or nineteen pounds of cooked corn is equal to fifty pounds of raw corn for hog feed. Mr. Mason, of New Jersey, proved that pork fed with raw grain cost 12½ cents a pound, and that from cooked food 4¼ cents. Cooked corn stalks are as soft and almost as nutritious as green stalks. It is an improvement that pays. Cattle can be fatted at about half the expense upon cooked food in a warm stable, that others can out doors fed upon raw food. I would not cook food for horses. Carrots are valuable for horses, because they assist food to gelatinize. For oxen 30 quarts of corn meal boiled in 60 gallons of water, and poured over cut corn stalks, made excellent feed. It is well known that hogs fatten fast that follow cattle fed with whole corn. In all stables a great deal more food than we can afford to lose, passes off undigested and goes into the manure pile. It is poor economy to feed hogs or horned cattle on any kind of raw grain. All coarse feed should be chopped, and corn stalks in particular are increased in value very much by steaming.

Solon Robinson said, that a person in Indiana told him that he confined two hogs in a narrow pen—one forward of the other—and fed the first with whole corn, leaving the other to live as he could upon the meal ground by the one ahead of him. The result was that the one in the rear fatted first.

Professor Mapes said that so much of the corn consumed by the first passed through undigested, that the one in the rear obtained his food ground and partially cooked.

Mr. Robinson said that all the western cattle feeders kept hogs to pick up the corn undigested by the bullocks; that they often are fatted ready for the knife in that way.

ICE HOUSES.

Professor Mapes—There is a great mistake in building ice houses with walls filled with tan, straw, earth, or even charcoal, though the latter is the best substance. But the best thing, as has been fully proved by Mr. Tudor, the great ice merchant of Boston, is hollow walls, containing a statum of air. Ice houses need not be made below the surface if properly constructed above, and made to contain a large cube of ice.

Dr. Wellington—A cube of less than twelve feet, Mr. Tudor says, can never be relied on to keep ice. Three or four dollars additional expense in building will enable a person always to have ice, when in a smaller bulk it would all melt.

Professor Mapes—I have heard it stated that Mr. Tudor makes ice in a tank built on piles above the ground, and takes it, when formed, right on ship-board.

Dr. Wellington—He tried that plan, but it did not succeed. He built a tank some 1,500 feet long and 600 wide; the ice froze bottom and top, leaving water or a hollow in the middle.

Dr. Waterbury—I have seen an ice-house filled by letting in water from a spring, gradually adding to the bulk till a solid cake as large as the square of the building was frozen. Then the roof was put on and the ice kept well.

Solon Robinson—The objection in that plan is the difficulty in getting it out. Some one proposed to furnish the city of New Orleans by freezing flat boats full of solid ice, in the Upper Mississippi, and floating down; but he found upon trial that he could only get the ice out by chopping it up so fine that it would melt directly.

The ice-cutters of Boston build in stacks near the railroads, filling the interstices on the outside with fine hay, and covering

the top with hay and boards, to shed off the rain and snow, and being in large masses, will keep a long time without wasting materially. The great error in building ice houses is making them too small. If a family wish a supply of six tons a year, they should build a house big enough to hold thirty or forty tons, and fill it the first good season, and keep the old in over from year to year, adding enough for current use each winter. In that way the small quantity needed in summer will keep—the large mass keeps it cold. It is only expensive in the first filling.

This subject will be continued at the next meeting, and several other interesting ones.

Chester Coleman, of Brooklyn—Mr. Chairman, I have recently met with a statement (although I never saw it published) which to me, as a fact, seems rather singular, in relation to drought. We are all familiar with the universal complaints of drought throughout our country during the past season of this year. In 1838, just sixteen years ago, a similar drought, equally severe, prevailed during the summer months; and a similar drought also extended over the country during the summer of 1822, just sixteen years prior, probably within the recollection of us all. And I am informed that these visitations of severe drought have been traced back to the years 1806 and 1790, at regular intervals during four periods of exactly sixteen years—but how much further these periods of equal time have extended, I have been unable to trace. I have heard it remarked that periodic droughts were as *necessary* to the country as the varied changes of the seasons, for the recuperative energies of nature to the productions of the year. Perhaps some one more philosophic than I am may be able to throw additional light upon these facts.

Subjects ordered to be continued:

Building ice houses.

Uses of salt and lime in agriculture.

Washing fruit trees with alkaline washes.

The chairman presented samples of the Livingston pear and Beurré D'Aremburg from his farm. The club repeated the opi-

nion that the small seedling now called after the Chairman, the Livingston pear, is one of the first in point of rich flavor.

The club then adjourned to December 19, at noon.

H. MEIGS, *Secretary.*

December 19, 1854.

Present—Messrs. Robert L. Pell, President of the Institute, Hon. R. S. Livingston, Prof. Mapes, Solon Robinson, Griffin and Gore, of New Jersey, Coleman, of Brooklyn, Paul Stillman, of the Novelty Works, Messrs. Waring, Vail, Lowe, George B. Rapelye, the Consul at Lyons, Mr. Goodrich, Samuel Fleet, Prof. Youmans, Drs. Waterbury, Newton and Taylor, Col. Travers, his son Travers, and others—in all fifty-one.

President Pell in the chair.

Henry Meigs, Secretary.

According to the rule for desultory communications for the first hour, the Secretary read the following prepared by him, viz:

[Annales de la Societe Imperiale D'Horticulture de Paris, September, 1854.]

GRAFTING BRANCHES OF TREES.

By Mons. le Baron Marinville.

I have the honor to lay on your table the principal portion of a lateral branch from my Pyramid pear—the Summer Madeline—on which, in August, 1853, I had grafted (in escutchion) a large branch, two years old, from one of my pyramid magnificent Beurré pears. The graft appears to flourish, and I ordered my gardener, Berthault, to take particular care of it, to give all liberty to the sap, and to support the pears as they grew if necessary. The tree on which I grafted bore abundantly its own fruit, and my grafted branch bore twelve fine magnificent Beurrés. One of them was accidentally detached. This is an unequivocal application of the precious grafting methods of our experienced colleagues, Messrs. Forest and Luizet, by means of which I have gathered, these three years past, fine and abundant fall and win-

ter fruits, on trees that hitherto never produced any but small fruit of no value. I have also succeeded with several different fruit grafts upon the same tree. I have from my experience been led to believe that grafts of one kind on a tree of a different kind are to be preferred.

[Revue Horticole, Paris, November 1, 1854.]

THE RICE PAPER PLANT.

Mr. Fortune says that he ascended, lately, a river on the north-east coast of the island of Formosa. From the deck of our vessel I saw a long distance off very large white flowers on the sloping sides of hills. I went to examine them. I soon discovered that they belonged to the species Japan lily, and these flowers were the largest and most vigorous I ever saw. They were growing like wild primroses, without any cultivation at all. While I was admiring the lilies, I discovered the plants from which the Chinese make their famous rice paper, which Mr. Hooker has named Aralia papyfera, which appear to grow here without culture; but it was said to grow on an old field—once cultivated, but now deserted, and overrun with weeds and bushes. The most of the plants which I examined were about from four to five feet high, and an inch in diameter at the base; this stem preserved nearly the same thickness from bottom to top, and generally naked, having a crown on the top consisting of several large palm like, beautiful leaves, with long (pétioles) foot stalks. The under sides of the leaves and foot stalks were covered with a dense down of a beautiful brown color. This down is very easily brushed off. I could not find any of these plants in flower; they probably flower at a more advanced season. A great number of young rice paper plants were growing. A Chinese soldier took some of them up very carefully for me, and I set them in Mr. Beale's garden at Shanghai. In a few months I shall send some of the plants to England. The stalks contain a great quantity of pith, above all in the most vigorous top part of the stalk, with which the paper (wrongly called rice paper) is made. The Chinese call this plant Tung Tsaou. Botanists have been long misled by the name rice paper, as to the true character of the plant. The only good drawing of it I have seen in Europe is one brought by Mr. Reeves from

China some years ago, and is in the library of the Horticultural Society of London.

[Lindley in his "Vegetable Kingdom" calls ivy worts, Araliacea, but does not speak of the rice paper. Brandt says it is the membrane of the Artocarpus or bread fruit tree.—*Meigs.*]

I judge from the circumstances of Formosa that this Tung Tsaou will thrive in England, but not much further north. There are some of them already in the royal garden of Kew.

POULTRY.

The first premiums ever given by agricultural societies for poultry were given by the American Institute, on the proposal of Henry Meigs, Secretary of the Farmers' Club. It was at first deemed rather trivial, but very soon the great importance of it was seen, and the encouragement by public rewards has been very great here and in Europe.

In the London Farmers' Magazine of July, 1854, we see that after all the excitement as to Oriental poultry, the Dorkings are now in England deemed the most fashionable fowls of the day. Prince Albert exhibited *nine* of them at the Metropolitan Poultry Show last January, which took *first and second prizes.* At the West of England Show, the other day, they were clearly the chief attraction—the Cochin China suffering greatly by comparison with them. Mr. Hobbs, a successful exhibitor of poultry, may be considered no mean authority on this point, has publicly given in his adhesion to the Dorking: "He had tried all kinds, and had come to the conclusion that there was no bird so fit for common farm premises, and which the farmer could call *domestic poultry.*" The Dorkings were in the ascendancy, while the Cochin were going down.

[From the same.]

ON BREEDING HORSES.

Every farmer should breed all animals which he employs at work, and all which he fattens. Farmers of three to four hundred acres should breed two kinds of horses; those of less land

should breed work horses. Any farmer may breed and feed animals if he will turn his attention to the acquisition of the neces sary knowledge. The two kinds of horses are, one for purely agricultural purposes, the other for riding, hunting, working, &c. Different qualities are of course required. For farm use, horses of weight and promptitude; for quick purposes, those of elasticity and speed. The farmer must learn how to produce these results. A general mistake is committed by farmers, viz: "*Any mare is good enough to breed from.*" Not so. The value of the progeny depends fully as much, if not more, on the *dam than on the sire.* The female imparts to the foal, *size*, strength and vigor of constitution capable of performing any work required, and the male will supply *spirit* and *muscle.*

The mare should be perfectly healthy, her carcase roomy—barrel-wide—large and round formed, with the ribs curving from the back, the short rib "well home," or leaving a small space between it and the hook bone; thighs deep and muscular, bone of the legs flat and thin, clean of rank hair, must have no appearance of swelling or any kind of thickness; feet clean, firm and sound, pasterns short, but not thick and greasy; the arm in front wide and brawny, chest deep, shoulders oblique and sloping backwards at the withers, and shortening the back; top of the shoulder narrow, neck rising in an arched form from the withers, and drooping a little to the set on of the head; crest strong and firm, and thickening downward; ears long and firm, and quick in motion; eye prominent, bold, quick and lively; face broad between the eyes, and tapering to the muzzle; cheek bone not very broad, which shows coarseness; muzzle small, lips short and thin, nostrils expanded but neat; fore legs standing well forward, and not under the belly of the animal; bone clean, and short in hair, feet standing concave, and not flat; knee joints flat and broad; color of the animal black or black brown, *with white on the hind feet, but no more.*

A variety of color shows much cross descent. Horses that are white in color, or even having a white hair mixed in the coat, as grey horses, are reckoned to be delicate in constitution, and experience seems to confirm the observation.

The qualities of the sire require a like examination.—*Extracts by Henry Meigs.*

DEVON CATTLE.

[From the Prize essay of De Caird on the Economical and Agricultural Situation, &c., of the Counties of Eogland. Translated into French from De Caird's English work. By M. Bancelin Dutertre, Paris. Extracts translated by H. Meigs, October, 1854.]

The county of Devonshire presents a very interesting view on account of its variety. The greater part of its surface is very unequal, forming undulations with valleys sheltered from the cold, and very full of verdure. The climate especially suitable for the dairy. The people irrigate some of these rich little valleys. Cattle are peculiarly suited to Devon. Her race is one of the most graceful and best shaped of Great Britain. It has been of late years considerably improved. The cattle, cream and cider of Devon are generally esteemed.

The Devon people yoke two young or two old cattle together, and plough about one acre a day. They get from sixteen to twenty-four bushels of wheat an acre, or thirty-two bushels of barley. They get ten or fifteen hogsheads of cider from an orchard per acre. There are farms producing 150 hogsheads a year, half of which is drunk by the laborers. It is estimated that each of these laborers drink three and a half hogsheads a year. The wages of these men average from $1.75 to $2 a week, and from three pints to two quarts of cider a day. Each man brings, in the morning, his wooden bottle to receive his share for the day. The women are not employed in out-door work.

CLIMATOLOGY.

[Extracts by H. Meigs. U. S. Patent Office Report, 1853. Vol. 2.]

Distribution of rain in the temperate latitudes of the two continents. Observations adequate to a perfect judgment not yet had, but the older United States are illustrated in this report:

	Inches.	Averages of years.
New-York,.....	42.6	23
Savannah,.....	53.4	14
Astoria,.....	87.2	11
Sitka in Russian America,.....	79.5	2
Albuquerque in New Mexico,...	8.4	3

	Inches.	Average of years.
London,.....	24.87	30
St. Bernard Alps,.....	68.81	12
Rome, ...	30.86	40
Barnavul in Russian Asia,.....	9.54	4
Pekin, ...	25.68	4

Lowest Temperatures.

San Francisco, February,.....	33°	Fahrenheit.
Astoria, do	31°	do
Great Salt Lake, do	7°	do
Fort Ripley, December,.....	36°	below zero.

Paul Stillman commenced the discussion of the first question of the day, "Building ice houses," and with suitable drawings to illustrate, he remarked, designed by A. S. Lyman, a mechanic at the Novelty Works, for which he has applied for a patent. It is to be built above ground, and the sides and roof formed ten inches thick, by a succession of four sets of studs lathed and plastered, so as to make a wall of air tight chambers—outside of this a coat of ordinary siding with shingled roof. At the bottom of siding an open space of an inch is left to carry a current of air up and under the shingles, out of the ridge. The ice is to be placed in a cube of not less than ten feet square, upon a tight floor, six feet above the ground floor. The ice is held away from the sides of the building by studs, so as to leave a space all around, and so arranged that the cold air from the ice will fall down upon one side, between the plastered wall and the wall of the refrigerating room, where, as it becomes rarified, it will pass under the floor and up the other side, out through a ventilator in the roof. In this room, also ventilated, fresh provisions can be kept any length of time; the air is cold and dry.

Another plan is to place the ice on the ground floor, and surround it with a refrigerating room two to four feet wide all around. Charcoal should always be kept in contact with the air of the meat room, to absorb all effluvia.

O. S. Fowler has tried the plastered walls, and finds them to answer most perfectly.

President Pell remarked that he had been called upon to examine an ice house built upon a similar construction in Brooklyn, except that the fruit cellar was below the surface of the ground. In it he was shown three hundred barrels of apples of Newtown pippin apples, of which he examined twenty barrels, and in every instance found them in a state of decay. On examining the thermometer it indicated (Fahrenheit) thirty-four degrees, at which temperature fruit cannot be kept for a length of time, whereas at thirty-two degrees it will keep for years. I prefer an ice house below the surface of the ground infinitely to one above it, and built of logs of wood in preference to any other material.

Solon Robinson adverted to the method in Virginia, and the plenty of straw used. They drive double rows of stakes for an ice house; they fill in the space between the stakes with hay, and thatch the top thick with straw. This filled with ice, when they can get it, keeps. I had at the West a pile of straw as big as three of this room (86 feet long, 25 wide and 13 high), but no ice to keep, but an excellent ice house can be made with it.

Paul Stillman—And with hemp stalks with a brush bottom to drain off the water well.

Dr. Waterbury has seen an ice house so constructed that water was allowed to flow into it through an opening in the roof, and on falling to the floor in cold winter weather froze into a solid mass of ice. The door was boarded up across as the pile of ice increased in depth. In thawing weather the water was turned off and the roof boards replaced. The supply stream was at no time allowed to be so large that any surplus unfrozen water must drain away. The house was constructed above ground, was ten or twelve feet in its three dimensions, and was *filled in* with tan.

A late letter from the owner of this structure mentions it as unworthy of commendation, and yet it is very probable that in higher latitudes than its location, (that of Delaware county, New York,) such a structure may be found cheap and effective.

The economical production of ice must always be confined to latitudes where the temperature falls during the winter as low as

zero. A mass of ice formed in the way alluded to would measure in a rough way, by its depth, the severity of the winter in which it was formed. The gentleman who devised this plan succeeded in making only about five or six feet in depth. If he had been sufficiently diligent, the mass would at no time have fallen in temperature below 32°. As it was, it may be presumed to have remained at about that point, for with the commencement of warm weather it began to melt. The difficulty with this plan is that it does not expose a sufficient amount of surface. By the common process we gather together and pack down in a small cubic space the cold from the surface of an acre or so of exposure. This cold is reproduced for culinary or other purposes when the ice melts.

When ice is stored the sum of its useful properties is its *latent cold* (140°, by the absorption of which water at 32° becomes ice of the same temperature), added to its sensible depression of temperature below the freezing point, *i. e.*, towards zero. Ice put up in severe weather is worth more and keeps better than that put up in thawing weather, because it is colder. If the ice house be large and the ice be put in at a temperature near zero, it is said to obviate the necessity of drainage, ice at zero being to ice at 32° in value as 172 is to 140. The surplus sensible cold being sufficient to neutralize the rise in temperature of the mass during the summer months, none melts.

But the depth of ice that may be formed in this way, is two or three times the thickness of the ice that forms on the surface of ponds. As soon as a sheet is formed over water, it protects the water to some extent from the cold. The more completely a lake is kept skimmed of ice during the ice producing season, the greater is the quantity of the crop, though it is of a poorer quality. The successive formations are thinner and more disposed to thaw. Our annual ice formation measures by its thickness the severity of the winter, and its production absorbs and renders latent just as much cold (140°) as the same amount of water in freezing gives out heat. Nothing will freeze in a cellar where there is open still water until some time after the water is coated with ice. A tub of water may in this way be made to exert a

very sensible warming effect on surrounding objects by its freezing.

In this way are the sudden changes of our climate moderated, and to this physical fact do we owe the tolerable nature of our winters and the duration of the vernal and autumnal seasons. Without, sir, knowing anything of the physical geography of Fort Ripley, I venture to assert that if the thermometer falls there to 36° below zero, there is not much water in the vicinity. That the temperature of the valleys is higher than that of the hills in winter must be attributed mostly to the fact that they contain so much more water.

But these facts entice us to take another step. Daily observation teaches us that changes of temperature are a fruitful source of force. By heating rods of iron and allowing them to cool, a power may be exerted that can only be measured by their tenacity. If this operation could be performed with sufficient rapidity it might be made useful as a source of motion. When water is used instead of iron it can be performed with sufficient rapidity, and the expansion and contraction is much greater in amount. Whatever medium is used, the origin of the force is in the change of temperature So well has this come to be understood that the price of a ton of coal depends on its heat producing, or in other words its motor power.

Now the converse of all this must be equally true. *Changes of temperature, as they are going on around us daily,* MUST *be produced by some motor power.* What is that force? A perpetual motion is continually going on around us, and by the laws of mechanics it must be produced by the unceasing expenditure of power. Does this power originate in the variations of temperature produced in different parts of the earth's surface by the heating action of the sun?

In any machinery, when motion is to occur, the sum of the forces must exceed the sum of the resistances. The more machinery there is to be kept in motion, the greater become the resistances. No machine can ever generate an ounce of force, and the more complicated are our contrivances to effect that phantasy of

the imagination, a perpetual motion, the further we get from it. At the bottom lies the great equation of the equality of the forces to the resistances, and the intervention of the least machinery increases the resistances.

But the surface of the earth is a great machine in perpetual motion; winds are blowing, clouds are moving and rivers are running continually. It does not explain these phenomena of motion, to attribute them to gravity. Gravity would settle every thing in a short time and leave all things as motionless and silent as the vault of the fixed stars. Gravity is only the recoil of the Spring, the running down of the clock work. Gravity must be disturbed before it can produce any motion, and that disturbing power is the sun. The force that a cloud exerts in rising, is a force given it by the sun. The force that rain exerts in falling, is a reproduction of the power that it took to raise it, and the force that a river exerts as it rolls down into the sea, is but the same force that was spent in wafting it in clouds, up to the tops of the mountains. We must all the time keep returning to the sun as a source of power.

The motions of the earth on its axis and in its orbit must be subject to the same course of reasoning. We have been taught to believe, that it continued to move, because there is nothing to stop it. If it were set to do any work, just so much of the velocity would be destroyed, and by just so much would the diameter of its orbit be lessened and the year be shortened. This is actually happening with the years of some comets; it is generally supposed, because they are impeded by ether. Now, it is difficult to account for the tides by any chemical action of the sun; they are generally attributed to mechanical influences, and it is very probable, that we may yet discover, that some heavenly body is delayed in its motion, by being tasked to rock our oceans. This delaying force would amount to so little, when compared with the momentum of a planet, that it may as yet have been unappreciable.

Dr. Draper has shown how the chemical forces of the sunbeam are expended on the green matter of the leaf, in reducing a certain and definite amount of carbonic acid and water, and how

these forces are again eliminated in light and heat, by the reunion of the elements of those substances. It is a very significant fact, that no artificial process has yet succeeded in combining the elements of one organic atom. All modifications that we make of vegetable substances are steps towards their destruction. All animals live, in some way or other, by destroying what the rays of the sun have constructed. All steam engines run by virtue of the same process, and we scarcely lack the evidence of the identity of light, heat and electricity, that we may address the sun, literally, as "Eye and Soul of the Great World." Philosophy is verging on the Persian theology. So do the minds of men find themselves habited in the garments of their ancestors. The capacity of the human intellect is, after all rules, the fashion of thought.

Forgive me, sir, for having wandered so far from the matter of ice, but in the fields of nature there are so many cross paths, that we find, that a great many places, which by the public highway are far apart, are really, if we go "cross lots," in close proximity.

Amos Gore, of Bloomfield, Jersey.—As the air must be perfectly close in the double sides, &c., of an ice-house, the boards ought to be put together tongued and grooved.

Mr. Robinson wished the subjects to be settled now, before members begin to separate. He moved "The best manner of constructing *farm buildings.* Is there any necessity for *tenons* and *mortices* in small frames?"

Also, "The want of economy in warming our dwellings." By Judge Livingston, to continue the subject of "The uses of lime and salt in manure."

These three questions were unanimously adopted.

Mr. Paul Stillman presented some apples for trial, called vulgarly, Rappertrats, a corruption of the name of Robert Yates, given to the tree, which is now two hundred years old. Ruggles has them in his nursery at Schenectady.

This apple is of a good medium size, deep orange color, tender, and of pleasant sweetish flavor, in good keeping, and good when cooked.

The question for next meeting—"Lime and salt in agriculture, continued;" "Small farm buildings without tenons and mortices;" and "The want of economy in warming our dwellings."

The Club then (at about 2 o'clock P. M.,) adjourned to the first Tuesday in January, 1855, at noon.

H. MEIGS, *Secretary.*

January 2, 1855.

Present—President R. L. Pell, Judge Robert Swift Livingston, Dr. Church, Dr. Waterbury, Prof. James J. Mapes, Solon Robinson, Mr. Pike, optician, Paul Stillman, Tousey, Titcomb, Youmans, from California, Vail, Samuel Fleet, Coleman and Clark, of Brooklyn, Low, French, of the Jersey Phalanx, and others—forty-two members in all.

Hon. Robert Swift Livingston was nominated Chairman by President Pell. Henry Meigs, Secretary.

The Secretary read the following papers, translations, &c., made and prepared by him, viz:

COLZA.

From the great farm book of France, Maison Rustique, du XIX Siècle, we translate the following:

Colza is called by the English Rape, or Cole seed; in German, Raps; in Italian, Colza. It is of the family Cruciferæ, genus Brassica, (cabbage,) and of the group called Brassica Oleracea; has been designated by botanists as Brassica oleracea campestris, (that is) Field oil-bearing cabbage.

There are two principal varieties—one the Winter, the other the Spring Colza. The Colza or Colsa (which is still confounded with the turnip, in some places,) has smooth greenish blue leaves. The kind usually cultivated is known in Flanders by the name of *Cold Colza*, because it is the Winter Colza. Its flowers are usually yellow, its stalk more branchy, taller, the leaves are thicker and larger than the Spring Colza, the principal merit of which is, its early maturity. Winter Colza occupies the ground from one summer to another, while the Spring Colza ripens its

seeds in the same summer, a peculiarity very remarkable in any species of cabbage. Like all cabbages, Colza loves a free, well-tilled, and richly manured land.

Winter Colza is best sown broadcast. Immediately after a summer crop has been taken off, till the land and harrow it well; sow the seed broadcast, then harrow it in with a two toothed harrow; then roll it, first one way and then the other. Then have a sort of plow with small shares, eight feet apart, with which run furrows down the slopes of the field to carry off water. In about two months the plants will be well up; hill them up from the furrows. Good Colza growers use not less than forty loads of dung on a hectare, (i. e.) about eighteen loads an acre.

The seed required per acre is about a quart (it is about the size and color of turnip seed) for drill planting, and about three quarts for broad cast. The seeds are contained in long pods, with many seeds in each, say not less than ten. It is necessary to be particular in gathering the crop, for if too soon the oil is imperfect; if too late, you lose the seed by the bursting of the pods.

In Belgium they cut handsful with the sickle four or five inches from the ground, and lay them in rows as they proceed. In dry weather they cut only in the morning, because then the pods are firmly closed, letting very few seeds escape. When the stalks are dry enough, which is usually in two or three days, they gather up the whole in cloths, and carry them to the barn to be thrashed, and then the seed to the mill. The mill works the seed only when it is perfectly dry. The mill has a bed of straw about three to four inches thick on which they spread as much.

The crop is about ten bushels per acre, and yields about or nearly one half in oil.

But Perry, of Brooklyn, who has a company organized there, with a capital of $300,000, should look to oil from our cotton seed instead of colza. The seed of cotton is estimated to weigh about three times as much as its fibre, so that when our country produces three millions of bales of the fibre, of 400 pounds a

bale, we always have seed to make oil out of to the enormous amount of twelve hundred millions of pounds weight, or six hundred thousand tons. Now, if the seed yields 25 per cent of its weight in oil, then we may have per annum 150,000 tons of oil, an immense supply for lighting up all our houses. We have heretofore adverted to the use of cotton seed oil centuries ago by the Chinese; and it must be observed that for cattle feeding the cake left from the oil presses is excellent, or as the Chinese used it *as a manure for cotton itself.*

FIRST AGRICULTURAL SOCIETY AFTER THE PEACE OF 1783.

The Secretary read the following extracts made by him:

Minutes of the Philadelphia Society for the Promotion of Agriculture, from its Institutions in 1785 *to* 1810.

[Presented to the Farmers' Club of the American Institute by the Philadelphia Society, for promoting agriculture. From their Recording Secretary, Alfred L. Kennedy, M.D., Dec., 1854. Extracts by Henry Meigs.]

CITY OF PHILADELPHIA, *February* 11, 1785.

It was proposed to form a society in Philadelphia for the promotion of agriculture, and accordingly, Messrs. George Morgan, George Clymer, Robert Morris, John Cadwalader, Henry Hill, Philip Dickinson, James Wilson, Thomas Willing, Samuel Powell, Edward Shippen, Samuel Vaughan, Tench Francis, Benjamin Rush, Samuel Meredith, John Nixon, Charles Thompson, Richard Wells, Dr. John Jones, Dr. Adam Kuhn, Lambert Cadwalader, Richard Peters, Dr. George Logan, and John D. Bordley —23 in all; agreed to create an agricultural society.

They met accordingly at the house of Patrick Byrne, in Front street, Philadelphia, on Tuesday, March 1, 1785.

Present—Messrs. Clymer, Powell, Shippen, Vaughan, Francis, Rush, Logan and Bordley.

They chose Mr. Powell chairman. They appointed Messrs. Clymer and Bordley to sketch out a form of laws to be presented next Tuesday. Then only five appeared. The sketch of the laws was read and referred to the meeting on the next Tuesday.

Tuesday, March 15, 1785.

Present—Messrs. Powell, Clymer, Cadwalader, Francis, Jones, Logan and Bordley, who passed the laws and amendments. They had a President, vice do., Treasurer, and a Secretary for corespondence.

Regular meetings on first Monday of every month.

A law to publish approved papers.

A law for prizes for best papers.

A law to promote establishment of other societies.

Quorum—Five members.

New members chosen by balls of two colors.

Tuesday, March 22, 1785.—Present—Seven members.

Newspapers for their publications—Gazette, 3,000 copies per week, Bradford's War, 1,000; Bailey's Freeman's Journal, 500; Humphrey's Mercury, a newspaper.

Mr. Singleton, of Talbot, Maryland—note to Bordley—speaks of quicksilver water to destroy the chinch bug, a severe enemy of Indian corn. A member said that he had proved that salt and water was the most destructive to them, and to worms, and to other insects.

Experiment—Sowing wheat in clumps six to eight inches apart.

George Washington and Ben. Franklin elected honorary members, General Knox, do.

Members to pay $4 per annum to form prizes.

Prizes ordered February 14, 1786.—Best rotation crops, not less than four acres, $200 in plate.

Next best experiment, $100 in plate.

Best sheltering cattle.

Best mode of securing wheat from spewing out its roots in winter.

Best manure, composts, &c.

Best hogs, and how to raise them.

Best mode of restoring gullied lands.

Trench ploughing not less than ten inches deep.

Best clover crop. Greatest quantity and best manure, from the farm only.

Best remedy for worms, &c., Hessian fly, pea bug, &c.

Best way to plant wheat.

Best food to make milk.

Best way to raise the white thorn, &c., for hedges.

Greatest quantity of ground well fenced with locust trees or poles—of the sort used for posts and trunnels—and planted with locust seed—producing not less than 1,500 trees on one acre. Each of the foregoing a *gold medal.* For second best, *silver medal*.

Tuesday, May 1st, 1787. Attend immediately to raising timber trees, &c.

Tuesday, June 5, 1787. Geo. Morgan's paper on the Hessian fly.

Tuesday, Sept. 2, 1788. A letter from P. Muhlenburg, of the Supreme Executive Council of the State of Pennsylvania, requesting information on the Hessian fly. "The King of England's proclamation on 25th June last, no wheat from U. S. to be admitted in Great Britain, on account of the Hessian fly."

The society declared unanimously that the Hessian fly never touched the grain, but the *plant only.*

Premiums for 1789.

For best course of crops, on not less than four acres, agreeably to the English mode of farming. First premium, $200. Second, $100.

For hemp, Gold Medal.

Cheese, not less than 500 lbs., Gold Medal, and will pay for it ten per cent more than the wholesale price of the Cheshire.

Tuesday, May 12, 1789. The Gold Medal shall be of the value of ten pounds, Pennsylvania currency.

Tuesday, Feb. 9, 1790. The Hessian fly was not known here in 1782.

Tuesday, March 9, 1790. Cheshire cheese is twelve pence a pound.

Tuesday, January 11, 1791. Balance in the treasury, near $800.

Friday, Feb. 15, 1793. William Pearson, Burlington, New Jersey, claim for premium on his 500 lbs. cheese, objected to for want of *flavor only.* He makes 3,000 to 4,000 lbs. annually.

July 9, 1805. Remarks on Deneale's Threshing Machine, with a plate of it.

Cartwright's three coultered plow.

Hoxie's patent auger, for boring post holes in ground free from stones, &c.

A mould board of full size, made on Jefferson's plan.

Indian corn harrow, works well.

February 11, 1806. Scalded the roots of young peach trees before setting them out. Scalded the bottom of the trees about a foot; soap suds hot, baring the roots.

Levi Hollingsworth—Give poultry brick; fattens and saves food.

Vaughan—Charcoal fattens cattle and stock.

June 10, 1806. Dr. Meare showed half a pint of wheat raised in Ireland from wheat brought some years since from Palestine, by the eccentric Dr. Whaley, whose "Walk to the Holy Land" has been often noticed in the papers. The straw of the wheat when first brought to Ireland was a strong reed, not an empty hollow, but filled with nutritious sap or pith, which rendered it as provender for horses and cattle, *equal to oats.* The grain made an unusual quantity of the finest flour. The original cultivator of it sold his seed wheat for ten guineas a stone, (nearly $4 a lb.)

Nov. 11, 1806. An ear of Indian corn, of 26 rows, yellow flinty. Some ears of corn have thirty and even forty rows. Taylor, of Virginia, (author of the Orator,) has a hedge of cedar trees two feet apart, seven miles long. It contains 18,460 trees.

Mr. Vaughan showed an ear of corn from near the Pacific ocean, consisting almost entirely of farina.

March 8, 1808. Native grapes, and wine making from them.

Coarse flour and brown bread.

Hemlock for line fences, trench plowing, building walls, thickness, cement, &c.

On spontaneous new growths on burnt lands.

On draining.

Economical kitchen stove.

How to farm poor land, by Judge Peters.

The last minute, March 13, 1810. Sow oats as a pasture on worn out lands, to recover it.

Judge Peters on salt.

At the first meeting, March 8, 1785, there were but *six members* present. And at the last meeting, March 13, 1810, there were *ten members only*. And during the whole period of twenty-five years, the average attendance was about eight.

At the meeting on July 3d, 1787, Gen. Washington, Mr. Meredith, Governeur Morris, George Clymer, Mr. Sellers, Dr. Jones, Mr. T. Francis, and S. Hogdon, were the only persons attending. Eight only, when the Father of our Republic was one.

H. MEIGS, *Secretary.*

ICE HOUSES

Paul Stillman presented plans for a new arrangement and construction of ice houses.

In the construction of an ice house he would build above ground, and have the walls hollow, built with at least two interior divisions of laths and plaster, so as to interrupt the circulation within the space arising from a heated surface air on the outside, and a cooled and condensed air against the inside wall. The plan recommended by Mr. O. S. Fowler, in his work entitled "A Home for All," he thought to be a cheap and efficient one. That was, to erect, by insertion in the ground on a suitable foundation, a course of studs, which were well lathed, and plastered inside and out with hydraulic cement. At a distance of about four inches outside of this, another course of studs were erected, lathed on the inside before raising, and afterwards plastered from the outside between the studs, and then again lathed and plastered from the outside, thus making four plastered walls in the construction of each wall of the ice house, the whole being a trifle above twelve inches thick. The outer course of plastering might be made ornamental, in imitation of brick or stone, or it might be covered with weather boarding; in which case, Mr. Stillman recommended that the weather boarding be kept about one inch removed from the plaster, and left open top and bottom for the same distance, so that by ventilation the first wall is kept at a

temperature of the atmosphere—which has a desirable effect, particularly on the sunny side of the house, or where it is not otherwise protected from the sun's rays.

Another plan, in some respec s superior and probably more economical in construction, was presented by Mr. S. He would lay a stone or brick foundation below the action of frost. Eight inch walls, placed parallel and four feet apart, would do well; across these he would place a tier of beams, say three by eight inches, and eighteen inches apart, upon which he would lay a coarse floor, and across that he would place three by four inch scantling, at the same distance, on which he would lay a tight matched spruce floor—thus making a double and crossed flooring. If the lower floor should be covered with coarse mortar between the scantling, it would be an improvement, or if preferred, a single floor of twelve by eight stuff may be used, with one or two courses of what is termed deafening, with the upright plank spiked to the floor, after the plan of the balloon framing used in the Western States and California. For the sides of the house, he would erect upon the wall and firmly spike plank, say one and a quarter inches thick by twelve in width, to each end of the three by eight inch stuff forming the floor, to form the sides; and the same number of similar plank, erected upon the rough floor and spiked to the three by four inch floor scantling, for the ends of the building. The rafters he would make of one inch boards, well nailed to each other at the ridge, and to the upright one and a quarter inch plank at ten to twelve feet from the foundation, allowing them to extend some three feet to projecting eaves. Between these upright planks, he would make the four plastered walls as in the former plan, continuing them up between the rafters. To the outer edge of the plank he would secure the weather boarding, leaving the air space before named, which he would continue to the peak of the roof and out from under the saddle boards, so as to give ventilation to the whole weather surface of the house. To give stability to the structure, and to protect the plastered walls from being injured from the inside, he would ceil it with rough boards put on diagonally. If sufficient care has been taken to make all the joints tight, such a structure would be as effective as

any that can be made for the preservation of ice. The material for such a house, thirteen feet square and twelve high, would cost from $100 to $125, and the labor from $25 to $50. The roof should have wide projecting eaves on all sides; for which purpose a hip roof or one of four equal sides, terminating in a ventilator, would be an improvement, which would require a little modification of the plan of forming the roof, but only such as any carpenter could readily do. There should be two doors to the ice house, one opening outward, the other inward, and both should be doubled, and listed with strips of vulcanized india rubber.

But the chief feature of novelty in the construction of ice houses, which Mr. Stillman wished to call the attention of the club to was in the interior arrangement. The grand purpose of an ice house he contended should not be to store ice, but to store and preserve perishable commodities, those articles of luxury or of prime necessity that were produced abundantly only during a short season, and were required for the whole year; or animal food that deteriorates rapidly if subjected to the varying temperature and atmosphere of our climate.

Few of these things can bear the direct influence of the ice or the wetting occasioned by its melting. To avoid this, a plan was introduced a few years since to make the ice house of two stories, the upper one for the ice and the lower one for the conservatory. To keep the lower story cold, dependance was made either upon a metal floor for the ice, or upon metal or plastered sides, against which the melting ice would send its ice cold water. But this produced a damp and vitiated air which was found fatal to fine fruits and many other things.

To avoid this difficulty was what was now the desirable thing for an ice house, or for the preservation of those delicacies which cost us so much to produce, and yet give us so little time to dispose of them.

Mr. Stillman said he was happy to say that he believed that a plan was derived, and now an application for a patent was pending before the U. S. patent office for the same, which he believed would fully answer the end.

Mr. A. S. Lyman, the inventor of this improvement, he said, maintained that the very best plan to keep *gun powder*, when not protected by proper packages, was in one of his ice houses, *it affording the dryest atmosphere to be found in our climate*, and yet, as it was at such a low temperature that it was not one to desiccate and ruin the articles stowed in it. At the same time, whatever gases arose from articles placed within it were arrested and absorbed.

He said, that to arrange an ice house after the plan of Mr. Lyman it was necessary to make such a division of the vault or interior of the house as would give separate chambers for the ice and the articles to be preserved by it. This division might be horizontal or vertical, as suited the circumstances of the builder, but a horizontal division was regarded the better of the two. Suppose that in a house of the size described, four feet be separated by a vertical partition as high as the top of the ice when filled, and that the ice be kept from the two sides of the house by a rock or stud partition, one foot from each side, so as to leave a well of one foot in width at each of the two opposite sides of the ice. A hole of some two cubic feet should communicate from near the bottom of those wells to the space partitioned off for the conservatory. A rack containing *fresh charcoal* should cover these apertures. Now, supposing that suitable arrangements have been made to collect and conduct off the water formed by the melting ice, so as to keep the floor dry, and we have the house completed unless we wish the conservatory supplied with shelves, &c., which may be done as necessity may dictate.

Now it is evident that the air in immediate contact with the ice is the coldest, and so most dense, and therefore finds its way through the rock partition into the wells at the side, there passing through the charcoal into the conservatory, the rarified and vitiated air rising up and over the partition into contact with the ice, where it deposits its moisture upon the ice, and then falling in its turn into the well, and through the antiseptic strata of charcoal, thus keeping up a current or circulation *ad infinitum*.

Where it is desirable to take ice from the ice house it will be necessary to make one or both of the wells of sufficient width to allow an entrance by means of a door.

Ice boxes for domestic purposes may be constructed on the same principle, but it is necessary to make the division horizontal in order to get a sufficient height of condensed air to secure a proper circulation.

Railroad cars for the conveyance of fresh "fish, flesh and fowl" are also made on the same principle, but it has been found advisable to urge the circulation by means of a fan, as an additional security against an imperfect distribution of the cold air through the mass stowed in the cars.

Robert L. Pell, President of the American Institute, was requested to give some account of his own ice houses, and those he had examined on other estates.

Mr. Pell said that he would reply to Mr. Paul Stillman's remarks on this subject, and that he thought an *inverted log cabin* was the best for ice keeping. For thirteen years past he had enjoyed the advantages of such a house; and although it was only ten feet square by ten feet and a half deep, it afforded an abundance of ice for a large family, who used it without stint.

Last fall, owing to the decay of the logs, Mr. Pell was obliged to build a new ice house, and constructed one of brick, making the wall twelve inches thick, laid in cement, and the house sixteen feet six inches square, and of the same depth under ground. He carried the *west* wall two feet above the surface of the contiguous ground, and the *east* wall even with it. He covered it, and made four hatches, which are taken off in winter when the house is filled with ice. Four feet from the bottom a brick slide is carried at an angle to the surface. This slide is four feet wide. The bottom is covered with flags, the object being to introduce the ice to the lower part of the house, and then fill in gradually. It is packed in layers, and the interstices are filled with snow, which forms the best packing. He said that the lower portion of the house rested upon gravel, which forms the very best drainage possible. There are three ventilators on the top of the house.

The President called up the subjects of the day—among them, "Building farm houses, &c., without tenons or mortices."

BALLOON FRAMES OF FARM BUILDINGS.

Solon Robinson gave a very full description of the manner of building balloon frames, and denounced the plan of tenons and mortices in ordinary small houses or other necessary farm buildings, as one of the most absurd remains of old-fogyism in existence. He said that a house which a carpenter would charge $25 for the work of framing, could be framed for $2.50, and would be decidedly better than the other. Nearly all the frame buildings in Chicago, and in all the surrounding country, are built in the way he described.

Mr. Youmans corroborated Mr. R.'s statements, and related many interesting facts relative to the building of San Francisco and other California towns, which never would have been built if the old plan of framing had been pursued. Besides anybody could work at the business of house-building. He had adopted the plan on his farm in Saratoga county, where he found great difficulty in getting carpenters that would do as he wished. They could not give up tenons and mortices, braces and big timbers, for the light ribs, two by four inches, of a balloon frame.

Paul Stillman said that he had seen a whole block of houses built in two weeks at San Francisco, and better frames he never saw. They were put up a story at a time—the first two floors often laid and lower part of the frame sided and in use before the upper part was up.

Not one-quarter of the weight of timber in an old-style frame is used in a balloon. It is a matter of the utmost importance to farmers to understand what an immense saving may be made by this mode of building. The Chairman said that he certainly should try it upon his farm another year.

Prof. Mapes said that he had a house thirty feet square, two stories high, put up for his workmen, that gives comfortable accommodations to four families, upon contract, upon this plan, for $500. He says that a Mr. Woodruff, of Newark, has built a great

many of this kind of cheap tenements for the poor, which he can rent for half the usual charge on a brick house, and still make more money.

Mr. Robinson said that he was delighted to have such an endorser for his balloon story as the intelligent gentleman from California, Mr. Youmans. I told the good folks of Illinois, if they wanted a strong jail, to build it out of boards, and fill them full of nails, and there would be no *cutting out* of it.

Dr. Waterbury observed, that when these wooden houses are plastered, he has seen that by the expansion or contraction of the wood the plaster comes off.

Paul Stillman reminded the Club that plaster very commonly peels off from brick walls also.

Chester Coleman, of Brooklyn—I have seen balloon houses put up, and was very much surprised at the facility, quickness, and strength of them—their timbers being only about two or three inches, by four inches square. I watched the building of a dwelling house in this way. It was two stories, strong, looked as well outside as any frame house, and it cost but about three hundred dollars to build it. It was a very good demonstration of the value of the new idea. No tenons or mortices for the first farm edifices of our forest land. The house I have referred to was *built in a week!*

Mr. Robinson—To make a cheap, tight roof, they use very coarse paper, saturated with hot tar, and then well sprinkled with sand or gravel. When done a second coat it is good and cheap.

Paul Stillman—*And will burn very easily!*

Dr. Austin Church had recently seen some houses on the balloon plan at the West. They look well, and are strong, but I doubt their durability.

Solon Robinson—Sir, we are Christians, you know, and therefore we take no thought for the morrow.

Prof. Mapes introduced to the Club Mr. French, an agent of the North American Phalanx (in New Jersey), who presented samples of their preserved fruits, and samples of their method of putting up fresh fruits in square glass bottles, holding just forty ounces each, by exhausting the air, and then corking, and sealing, and covering with tin-foil, to keep them air tight. In this way the fruit retains its natural taste, and, in some cases, its fresh color and shape. The bottles are sold at from $4.50 to $7 a dozen. We wish that they could be afforded cheaper. Their contents were much admired by the large company present. The blackberries were considered the most perfect and natural in their taste. It is a great pity that a much greater quantity of this excellent fruit—so much of it going to waste every year—could not be bottled up for winter use, and sold at prices within reach of those who cannot afford to pay high for luxuries.

WAX FLOWERS.

Mrs. Emily Bates, of Franklin street, sent in for the admiration of the Club one of the most beautiful baskets of wax flowers, as natural as life. Is there not, in this line, work for ladies' fingers, otherwise unemployed.

Dr. Arthur, of Philadelphia, presented a new kind of fruit cans. A strip of tin is soldered around the edge of the can, so as to form a channel. On this, a mixture, made of 3 oz. of gutta percha to a pound of resin, is placed; when the can is filled with fruit, and the mixture warmed, the lid is pressed down, and when the cement cools it adheres, and becomes airtight. A slight warming will suffice to loosen the cover, so it can be taken off—and thus the can may be used time after time. Glass jars can be made in the same way, and covered with tin lids, saving corks and sealing; and as the gutta percha is only used in small quantities, and does not come in contact with the preserve, the flavor will not be communicated. It is an entirely new invention, for which a patent is applied for, and we think that it is worth the attention of fruit preservers.

Prof. Mapes showed the great importance of preserving for the whole year, the precious peaches and other fruits, while they are

at maturity. If this can be done at reasonable cost, it would prove a great source of health and pleasure to a whole people. He had examined the comparative supplies of the United States and Great Britain, with fruit, and found that the fruit of one week here, is equal to the whole annual importation of it in Britain. We owe a debt of gratitude to the North American Phalanx, for their attention to fruit preserving. They save some of our most valuable vegetables, by their new processes and great care. They have machinery with which that excellent *gumbo-ochra* is rapidly cut up in thin slices, which they cure in such a perfect manner, that, when used, one can hardly discover any difference between the fresh plant of summer and this dried ochra; its flavor is perfectly preserved.

Mr. Robinson—I wish that I could report as to the fruits in our markets as fully as I do as the meat. We are carnivorous! We pay for meat about *fifteen millions of dollars a year*, to the farmers. We eat *one hundred* and *sixty-nine thousand*, *three hundred* and *sixty-four beefcattle*, for only *one item*. I wish we were furnished with larger fruit eating propensities!

Benjamin Pike, Sen., of N. Jersey, remarked as to the Arthur cans for preserving fruit, that the air would be apt to be held under the tin cover, while it was being pressed down into the cement of resin and gutta percha. This won't do—it must be remedied by having a small vent for the air, which vent, when all the air is out of the can, can be stopped by some means; a drop of solder, for instance.

Prof. Mapes said, that Mr. Pike was right in this.

Mr. French, on request of the Secretary, gave the following list of the prices of the preserved fruits of the Phalanx:

			per dozen bottles.
Peaches in square glass bottles, holding over 2 lbs. weight,			$6 00
Quinces,	do	do	6 00
Blackberries,	do	do	6 00
Whortleberries,	do	do	5 00
Pie-plant,	do	do	5 00
Tomatoes,	do	do	4 00

On motion, the subject of: "Lime and salt as manure—Alkalies as washes for trees—and the best plan for constructing country houses, barns, stables, &c., were adopted for the next meeting.

The club then adjourned.

H. MEIGS, *Secretary.*

January 16, 1855.

Present—Mr. President Pell, Professor J. J. Mapes, of Jersey, Hon. R. S. Livingston, Chester Coleman of Brooklyn, Mr. Youmans of California, Mr. Griffing of Jersey, Mr. Darracott of Boston, Mr. Vail, Mr. Ferguson of Fergusonville, Delaware county, Dr. Waterbury, Mr. Low, Dr. Church, Paul Stillman, Mr. Pardee, Mr. French from the New Jersey Phalanx, Dr. Newton, Mr. Toucey, Mr. Chilson, Mr. Leigh, and others—in all 51 members.

The Secretary read the following papers prepared by him:

As we love to know the origin of all things, I give the following on Man's house building—

HOUSES AND FARM BUILDINGS.

Architecture, from the Greek αρχη, beginning or original; τεκτων, builder or building; a house made by certain rules suggested by nature and man's taste or opinion. When wealth comes then comes the high art. Notwithstanding the great lapse of time since the first buildings were made by man, we find three distinct conditions of men, each of which influenced his buildings at the period, and each of which has become a model of its kind. The first lived as hunters and used caves, and in some cases where they could, hollow places in the hill and mountain sides. Second condition, pastoral; stock rambling for feed. This was the period of tents, because they must of necessity be portable in order to keep on the travel for natural pasture. With agriculture came the domus, a place to sleep and to delay in, a house with its sloping roof to carry off rain. A long time elapsed before man put a second story on the feeble cottages of one story. We have commenced in our country with green logs, notched at

the ends so as to secure the square in its place without nails or pins, the interstices of the logs crowded full of soft clay to make it tight. I have volunteered my labor with others on the Oronee river, fifty-three years ago, to build such a house for a new comer and family; and we made it in one day; and the new citizen and his wife and children were inaugurated there the next morning, with boiled ham, some venison, a corn cake about the diameter and thickness of a good-sized grindstone, with a good lot of light wood (old naked pine canes and knots, mere lumps of pitch) to warm and light the family. From this to dwellings of sawed timber and boards, and now to balloon houses, best of all for people like us in a hurry.

Solon Robinson read the following letter:

Windsor Locks, Conn., *Tuesday, Jan.* 9, 1855.

Dear Sir—Will you not give in the Tribune some little description of the "Balloon Frames of Buildings" referred to in the notes of the Farmers' Club Meeting in your number for January 5. It would be acceptable to many readers of the Tribune.

In regard to ice houses, I think you are mistaken as to the impossibility of keeping ice in houses of small dimensions. I have an ice house of the capacity of an eight feet cube. I fill it only to a depth of six or seven feet, and it lasts me through the season. Another house a few rods distant, a thirteen feet cube (more than four times the capacity of my own), is uniformly spent by the 1st of September. My ice house is nearly one-half underground, the soil a heavy clay loam, with hard clay at a depth of two and a half or three feet. There is standing water not more than twenty feet distant, and one foot below the bottom of the ice house. My walls above ground are about twenty inches thick, filled in with sawdust, the bottom gravelled, no planking, and a blind drain to take off the water on account of the impervious nature of the earth. I fill by freezing the water discharged in spray from a single jet from a half inch pipe. I have used this method now five years. It is less convenient in respect to cutting out ice for use, but it saves the expense of filling, and the objection is not considerable. The plan would hardly answer,

however, so far south as New-York or its vicinity, but the cold here is barely sufficient in average winters. The process of freezing also requires some little attention to shut off the water when the temperature is 30° Fahrenheit, or more, and to keep the house covered in case of storm or warm weather.

My theory in regard to ice houses is that they want, not large capacity, but complete protection. Of course, a large body of ice will keep longer under the same circumstances than a small one. But a six feet cube of ice can be made to serve the wants of an ordinary family for the season perfectly well. In such a case the walls should be thirty or thirty-six inches thick above ground. if filled with saw dust, sand or gravel (half that perhaps if filled with charcoal dust), the roof double and as tight as possible (I use a single canvass roof myself for lightness), and a perfect drainage, but without any communication of air through the drain. Under ground ice houses will always do well if they have a good blind drainage, either natural or artificial, and a little sand or gravel, perhaps, between the side planking and the earth walls, if the earth is wet. The floor should be of gravel, plank flooring only serves to give a circulation of air completely round the body of ice, which is not particularly favorable to its preservation. Air spaced walls are not good for ice houses, I think, notwithstanding so good an authority as Professor Mapes. The air, being highly mobile, is put in rapid circulation by the heat of the external wall, which is, perhaps, exposed to the direct rays of the sun, and communicates that heat to the inner wall, and thus to the ice within. If the air could be kept motionless in such a space it would answer an excellent purpose. But considering its extreme mobility, a four-inch space were much better filled with some such material as saw dust than left empty. But such a wall would be good for nothing for an ice house in either case.

But I have been betrayed by this matter into a long communication when I only took my pen to ask a description of "balloon frames." Respectfully yours,

SAMUEL H. ALLEN.

HOW TO BUILD BALLOON FRAMES.

Mr. Robinson said—At our last meeting I made some remarks which were followed by others upon the subject of "Balloon Frames" of dwellings and other public buildings, a slight sketch of which I published in the Tribune, not deeming it important to enter into the minutiæ of hours to make such buildings. I find that I did not appreciate the importance of the subject, for I have received a score of letters and personal inquiries from various parts of the country showing that a great many farmers would like to know how to build a farm house for half the present expense. I therefore ask the indulgence of the Club while I start a balloon from the foundation and finish it to the roof. I would saw all my timber for a frame house, or ordinary frame out-building, of the following dimensions: two inches by eight, two by four, two by one. I have, however, built them when I lived on the Grand Prairie of Indiana, many miles from saw mills, nearly all of split and hewed stuff, making use of rails or round poles, reduced to straight lines, and even thickness on two sides, for studs and rafters. But sawed stuff is much the easiest though in a timber country the other is far the cheapest. First, level your foundation, and lay down two of the two-by-eight pieces, flatwise, for sidewalls. Upon these set the floor sleepers on edge 32 inches apart. Fasten one at each end, and, perhaps, one or two in the middle, if the building is large, with a wooden pin. These end-sleepers are the end sills. Now, lay the floor, unless you design to have one that would be likely to be injured by the weather before you get the roof on. It is a great saving though of labor to begin at the bottom of a house and build up. In laying the floor first you have no studs to cut and fit around, and can let your boards run out over the ends, just as it happens, and afterward saw them off smooth by the sill. Now set up a corner post, which is nothing but one of the two-by-four studs, fastening the bottom by four nails; make it plumb, and stay it each way. Set another at the other corner, and then mark off your door and window places, and set up the side studs and put in the frames. Fill up the studs between, 16 inches apart, supporting the top by a line or strip of board from corner to corner, or stayed studs between. Now cover that side with rough sheeting boards unless

you intend to side up with clap boards on the studs, which I never would do, except for a small common building. Make no calculation about the top of your studs; wait till you get up that high. You may use them of any length, with broken or stub-shot ends, no matter. When you have got this side boarded as high as you can reach, proceed to set up another. In the meantime other workmen can be lathing the first side. When you have got the sides all up, fix upon the height of your upper floor, and strike a line upon the studs for the under side of the joist. Cut out a joist four inches wide, half inch deep, and nail on firmly one of the inch strips. Upon these strips rest the chamber floor joist. Cut out a joist one inch deep in the lower edge, and lock it on the strip, and nail each joist to each stud. Now lay this floor, and go on to build the upper story, as you did the lower one, splicing on and lengthening out studs wherever needed, until you get high enough for the plate. Splice studs or joist by simply butting the ends together, and nailing strips on each side. Strike a line and saw off the top of the studs even upon each side—not the ends—and nail on one of the inch strips. That is the plate. Cut the ends of the upper joist the bevel of the pitch of the roof, and nail them fast to the plate, placing the end ones inside the studs which you will let run up promiscuously, to be cut off by the rafter. Now lay the garret floor by all means before you put on the roof, and you will find that you have saved fifty per cent of hard labor. The rafters, if supported, so as not to be over ten feet long, will be strong enough of the two-by-four stuff. Bevel the ends and nail fast to the joist. Then there is no strain upon the sides by the weight of the roof, which may be covered with shingles or other materials—the cheapest being composition or cement roofs. To make one of this kind, take soft, spongy, thick paper, and tack it upon the boards in courses like shingles. Commence at the top with hot tar and saturate the paper, upon which sift evenly fine gravel, pressing it in while hot—that is, while tar and gravel are both hot. One coat will make a tight roof, two coats will make it more durable. Put up your partitions of stuff one-by-four unless where you want to support the upper joist—then use stuff two-by-four, with strips nailed on top, for the joist to rest upon, fastening altogether by nails, wherever

timbers touch. Thus you will have a frame without a tenor, mortice, or brace, and yet it is far cheaper, and incalculably stronger when finished than though it was composed of timbers ten inches square, with a thousand auger holes, and a hundred days' work with a chisel and adze, making holes and pins to fill them.

To lay out and frame a building so that all its parts will come together requires the skill of a master mechanic, and a host of men and a deal of hard work to lift the great sticks of timber into position. To erect a balloon building requires about as much mechanical skill as it does to build a board fence. Any farmer who is handy with the saw, iron square and hammer, with one of his boys, or a common laborer to assist him, can go to work and put up a frame for an out building, and finish it off with his own labor, just as well as to hire a carpenter to score and hew great oak sticks, and fill them full of mortices, all by the science of the "square rule." It is a waste of labor that we should all lend our aid to put a stop to. Besides, it will enable many a farmer to improve his place with new buildings, who, though he has long needed them, has shuddered at the thought of cutting down half of the best trees in his wood lot, and then giving half a year's work to hauling it home and paying for what I do know is the wholly useless labor of framing. If it had not been for the knowledge of balloon frames, Chicago and San Francisco could never have arisen, as they did, from little villages to great cities in a single year. It is not alone city buildings which are supported by one another that may be thus erected, but those upon the open prairie, where the wind has a sweep from Mackinaw to the Mississippi, for there they are built, and stand as firm as any of the old frames of New England, with posts and beams sixteen inches square.

THE USE OF LIME AND SALT IN AGRICULTURE.

Dr. Waterbury.—These inorganic substances, lime and salt, are as necessary ingredients in the composition of animals as they are of plants. We are not to suppose that they exist in the living tissues in the same *form* as that in which we obtain them on ultimate analysis. Changes are effected by the heat of combustion

that render the greatest portion of the result, viz., ashes, insoluble, yet we know that every component of the plant or animal must have gone into its circulation in the soluble form, and must have existed in that form in the circulating fluids. Potash does not exist in plants or animals in the caustic condition, and the insoluble residuum known as leached ashes, must have once been completely dissolved. The earth in the bones of animals is derived from this food, and while forming a part of their bodies, is rendered soluble or insoluble by some peculiar vital action that is not well understood, though this action is undoubtedly of a chemical nature. If from any cause a portion of bone lose its vitality, the power to remove it by solution in the vital fluids (in the way that healthy bone is continually renovated,) is lost. The dead bone is as insoluble as so much ivory, and a process of festering is set up for its expulsion. This is the condition of things at the bottom of those ulcers known as "fever sores."

If the food of an animal is deficient in the inorganic ingredients, can these substances be given to that animal in the crude condition, so as to make up for that deficiency? In other words, can the stomach and other digestive organs so alter the nature of crude mineral substances as to render them soluble and fit to be used in the animal economy? If so, animals may, like plants, be benefited by *special appropriations* of these substances. We are naturally inclined to assume the negative of this question and to suppose that all substances used as food by animals, must be of a vegetable or animal nature. Patent medicine and nostrum makers find it politic to assure the public, that they are "*entirely vegetable*" in their composition. Yet it is now generally admitted among physiologists, that when the food is deficient in these necessary inorganic ingredients, such deficiency may be sometimes remedied by a supply of the raw material. Hens consume lime, rubbish, and waste shells, and if deprived of these substances, or some other supply of lime, lay eggs without shells. Herbivorous animals consume salt. The medicinal action of iron is now too well established to be questioned. It is a natural ingredient in the blood, and is generally presumed to produce its effects by entering the circulation. The mineral poisons have been repeat-

edly detected in the blood of animals poisoned with them, and calomel, though quite insoluble in water, is well known sometimes to come out through the skin in some form, capable of tarnishing gold. Thus we see that certain inorganic substances *do* form the basis of those chemical compounds known as animal and vegetable tissue, while many others *may* enter into their composition for certain remedial or poisonous purposes. Yet it is true that in that diseased condition of the bones which is attended with a deficiency of mineral basis increasing the amount of lime in the food, has not been attended with that favorable result which was at one time anticipated. This is accounted for on the hypothesis that the disease is primarily a disease of assimilation, and connected with imperfect digestion.

When we compare those chemical constituents of plants that are elicited on *proximate* analysis, such as starch, gum, sugar, vegetable albumen, cassein, &c., with the proximate elements of the composition of animals, such as fat, nervous substances, muscle and blood, we shall observe a correspondence, one may almost say, an identity of composition between the *food* and the *feeder*.

This chemical connection is well known to exist between the dressed flesh of certain animals and the food on which they have been fattened. Beach nut fed pork differs from potato fed, or milk fed, or corn fed pork. The flavor and quality of butter is well known to depend on the grass on which the cow has been fed, and that of certain favored districts bears the highest price. The flesh of wild animals has a different flavor from that of the domesticated, and of course must have been in a different condition during life. Do corresponding differences exist in the chemical nature of the flesh of the different varieties of men? The Ethiopian is known to possess a peculiar odor, and the Californians allege that the Chinese have a fish-like smell.

A close relation exists the world over between the Floras and the Faunas in their geographical distribution, and this connection can be shown to exist between the distribution of certain grains and civilized man; so that the progress of science and art in the history of the world is the record of the progress of the

cereals. As these grains journey westward, westward civilized men journey.

"Westward the tide of Empire takes its way."

It is probably for these chemical reasons, rather than from any peculiarity of climate pertaining to those latitudes, that the southern zones have never produced any eminent men—have never contributed anything worth mentioning to the events of history. The conquering progress of the Anglo Saxon depends as much on the superior power of endurance which pertains to his bodily organization, as it does on the fact that more Anglo Saxons than Indians can live on a square mile. His superior power of endurance is derived from the superior nature of his food, and has been very certainly shown to exist by the annals of our frontier wars.* The African race, by the difference in the condition of the American negro and that of native African, still further exemplifies this doctrine, while the fact that the bread fed colony of Liberia does not degenerate into the rice fed aboriginal race, almost proves it. If this hypothesis is true, the existence of Liberia as a civilized republic, depends on the presence of the cereals in that republic as articles of food,† and consequently, if they cannot be raised in that climate, the progress of civilization in that dark region of the earth depends on their commerce, on their importation of bread stuffs, and their exportation of their own tropical productions. It has been shown here on a former occasion, how that mingling of the productions of the earth effected by commerce leads to the highest physical condition of men; how the *surplus* of these productions, as of rice in one region and of palm oil in another, and of cereals in another, and

* The fact that the rice fed millions of Hindostan submit readily to the government of a few thousand Englishmen, is in point, although more of them can exist on a square mile than of Englishmen. Dispatches from the east agree that the Russian soldiers carry a *coarse black* kind of bread in their knapsacks.

† A gentleman who was for some years connected with that colony, informs me that the colonists are relatively as different from the native negroes as white men are different from the colonists, and that they delight to exercise this superiority. He adds that the appetite for bread is great among the natives—that they eat a dry crust of it as children among us eat sweet cake; that they have another such appetite for salt, and carry it in little bags from the sea coast to the interior.

The cereals grow well in California, and I believe in Australia.

of ice in another, is worthless, or next to worthless, in regions where they are produced, and yet are of inestimable value in those regions where these substances are not produced, for *tempering* the composition of men. A perfect commerce, one that shall completely diffuse and blend together the different productions of the different regions of the earth's surface, so that men may choose completely their diet, and fully exercise their inventive powers in new combinations of the raw material of things, is a necessary physiological requisite to the advent of the "coming man." Such natural circumstances must attend the incarnation of this myth of ours, and we are not to expect him until a perfect communication shall have been established with the different nations of the earth.

Prof. Mapes—Lime is mistaken as a manure. It is not so. Plants contain lime, but the use of it in agriculture is not properly a manure. But it is a decomposer of vegetable matter and manufacturer of manure. Thus wood is rendered pulverulent by lime, and fitted as pabulum for plants. It requires 700 lbs. of water to dissolve one pound of lime. However minute the quantity of lime in soils, the plants will find all that is required in their structure. Turnips need lime, yet they are 93 to 97 parts water, hence the quantity of lime must be very small. It plays the part of forming all the salts required by plants. It will fit phosphorus for food for growing plants. Free chlorine is seized hold of by lime in the oil. Where it is used largely upon soils full of ammonia, it does more harm than good, because it sets the ammonia free; hence it should never be used upon manure heaps. Salt is useful and necessary in the growth of plants. Beginning with a mixture of salt and lime, we end with chlorine and carbonate of soda, which absorbs and retains ammonia. Lime travels down through the soil as far as it is plowed; hence it should always be placed upon the surface. When land has been limed many years, a deepening of plowing is often equal to a new dressing of lime. Sow dry salt, from six to twenty-five bushels per acre, it will kill grubs. You should not throw it on rows of potatoes, but between them, to kill grubs. A small quantity of salt will hurry the decomposition of muck heaps. Mr. Dodd, of Newark, says, that the lime and salt mixture around peach trees will kill peach worms.

Many plants exhaust lime so rapidly, as to require its renewal frequently; among these may be named the apple tree. Eighteen per cent of the ash of leaves and bark of the apple tree is lime, and therefore old orchards are frequently denuded of their lime, and require its renewal.

Pebbly soils, particles of which have been worn smooth, and in the pebbles of which are pent up many of the requirements of plants, are materially improved by the use of lime, which should be applied in small and frequent doses; for all must have observed, that lime will pass down through the surface soil and locate itself upon the surfaces of the sub-soil, where the closer texture detains it—and this passing down occurs so rapidly, that, where large doses of lime are used, all the effects that might have been obtained by its continuous descent, as when applied in smaller quantities and more frequently, are not availed of.

Lime, when properly prepared, may be used in the preparation of many composts. If used in its pure state, the nitrogenous portions of composts are so rapidly decomposed, that they escape in the form of ammonia; thus every farmer knows that lime should never come in contact, in its pure state, with stable manure, for even after being thoroughly slaked and left exposed to the atmosphere for a long time, so as to be changed to carbonate of lime, it will still disengage ammonia. If, however, the compost contains a very large amount of charcoal dust, decomposed muck, or other material capable of taking up ammonia as disengaged, then lime may be mixed with such compost in moderate quantities, for the disintegration of woody fibre, &c.; but, as the same powers of disintegration may be availed of, when the lime is previously treated with salt, as in the making of the salt and lime mixture we have so often described, it should so be used, whenever applied to composts; for the chloride of lime, thus formed, being rendered soluble, does not sink in the soil, but is absorbed by and combined with the different material with which it may come in contact, and a less quantity of lime in such form, is more effective than when suffered to approach the soil in the form of a carbonate; for as such so large a quantity of water is required for its solution, that it gets beyond the more active portion of the soil, by sinking before being dissolved.

Many a soil requiring lime, and having large quantities underlaying the surface-soil, immediately on the sub-soil, has been restored by the free use of sub-soil plowing, thus elevating and re-dividing the lime through the mass.

Sandy soils, by the frequent use of lime in small doses, are rendered more adhesive, while clayey soils are rendered more pulverulent. It must be remembered, however, that, while lime is an active agent in rendering all the contents of the soil available for the use of plants, still in doing so it will rapidly exhaust soils of those materials, that are there in lesser quantities, consequently the other manures used should be such as would replace those ingredients so rapidly to be parted with.

Soils that are overcharged with inert vegetable matter, are benefited by the use of lime and its compounds, by scouring the decomposition of this inert matter, and the yielding up of its integrants.

Poor soils to which cheap organic matter is freshly added, are also improved by the use of lime, for, while it assists in freeing the inorganic constituents of such soil, it prepares humus for combination with them, while they in turn as freed, assist in the decomposition of the vegetable portions.

Many a farm has been ruined for a time by the injudicious and excessive use of lime, and the remedy is, first, to add large amounts of organic matter, such as swamp muck, ditch and pond scrapings, and river mud; and secondly, such missing constituents as have been parted with from the soil, in consequence of the stimulating properties of the lime in the growth of previous crops. Where cheap organic matter cannot be procured, green crops can be raised on over-limed land, and plowed in, and those should be selected which take the largest amount of carbon from the atmosphere. Among these may be named clover, field peas, buckwheat, &c.

CULTURE OF HOPS.

Mr. Ferguson, of Fergusonville, New-York:

The best soil, probably, for hops is a gravelly loam, although any soil that will produce good corn will yield hops. The more level the land the better, as it will be less liable to wash in heavy rains.

The ground should be well manured with barn yard manure, plowed in, and well mixed.

The ground should be subsoiled, in order to allow the hop roots, which run deep, to take firm hold as soon as possible.

When the ground is put in proper order, plant with corn, the hills three feet apart each way. At the same time, or as soon as the corn is up, plant your hop roots at every other hill, of every other row, so that the hop hills will be six feet apart each way—the rows one way running north and south, to admit the sun's rays between the rows at the middle of the day.

The roots for planting are taken from old hop yards, by passing a hook similar to a potato hook around the hill, taking up those roots nearest the surface called runners; thus at the same time clearing the hill of unnecessary roots, and loosening the soil, and also furnishing cuttings to plant other fields. These runners are full of joints, and what you may call eyes, and the slips to be planted ought to contain two eyes each.

These slips may be set in the ground endwise, or laid horizontally, and covered lightly. The latter mode is considered preferable. Spring planting is preferred to fall planting.

The hop will soon shoot forth, if the ground is in proper order, and is dressed with the corn the first season.

After the corn is harvested, the hops must be covered with a shovelfull or two of manure, and, thus protected, is left until spring. As soon as the frost is entirely out of the ground, the hill is uncovered, and the poles set.

As soon as the vines are high enough to reach the poles, they are to be brought in contact and tied, and the plow or cultivator must be employed to keep down weeds and loosen the soil.

The process of trimming will last for some time, that no surplus shoots may be allowed to take up the strength of the soil. Two vines are sufficient for one pole.

Passing over the process of picking, drying, and baleing, which would require a rather extended notice, we only add that the yield per acre extends from 500 to 1,500 lbs. According to the character of the soil, culture, and season.

Probably a fair *average* yield would be about 800 lbs. per acre. If, however, the hop is properly cultivated, and if it escape those casualties to which it is more or less subject, as grubs, rust, the fly, or violent hail, the yield is generally larger than 800 lbs. This, at the prices of the last and present year, renders it a very profitable business. Hops this year have sold for 32c. to 35c. Indeed it would be profitable at one half the prices of the last season.

The expense of cultivation, after the drying kiln is prepared, will not greatly exceed the expense of corn cultivation, save that it requires rather more manure.

Stable or barn-yard manure is deemed the best, and of this large quantities may be made by farmers, with little expense.

F.

January, 1855.

Prof. Mapes—The increased use of hops, and consequent increase of price, has rendered their culture and mode of preservation of the highest importance. It may not be known to some of our readers, that the leaves of the hop have no valuable property.

The *lupulin* alone contains all the soluble portion of the hop. This term *lupulin* is given to the *pollen* or *farina fecundi*, which may be separated by machinery, and we cannot understand why this has not been done.

It would not be difficult, at a small expense, to thrash the hop with a properly constructed machine, so that the *lupulin* would be entirely separated from the leaves, and thus the valuable portion of a bale of hops could be soldered up in a tin can of small size, rendering the transportation cheap, and the value exact.

The brewer could afford to pay an increased price for the separated *lupulin*, as compared with the value of the hops from which it is taken; for the presence of the great mass of leaves in his beer, must necessarily soak up a large portion, which is thus lost, while the leaves themselves are of no use.

During the transportation of hops in bales, much of the *lupulin* dusts out. The leaves are subject to decay by moisture, and thus the aroma, one of the valuable properties of the *lupulin*, is materially injured. Separated from the leaves, however, the *lupulin* may be preserved for any length of time, and when thrown into hot water, its soluble portion is readily given off, which no doubt constitutes almost its entire mass.

We are aware of the difficulty of presenting an article in a new form, and of finding a ready market, but a single trial by any brewer, would convince him of the advantages arising from this method, and many simple tests could be devised, by which the exact value of this increased *pollen* could be known. The curing of hops by such process would be rendered comparatively simple; for the very machine used to separate the *pollen*, might be supplied with fan blowers, capable of assisting the drying of the hop, and thus much room might be saved, now required for the curing of hops, when to be sold in their entire form. We should be glad to hear of objections from practical men, if any exist. The fact that the value of the hop is due entirely to its *pollen*, and consequently that the leaves have no value, is too well known to be disputed, and the only points, not settled, are those connected with its separation, and the readiness of dealers to purchase the separated article.

DRIED OKRA.

The North American Phalanx placed upon the table specimens of dried okra, which the members present took home, to try the

value of; many of them never having seen this article of food, and scarcely a dozen of the large number present had ever tasted it.

Solon Robinson called the attention of the club to its great value as an ingredient in soup. At the South, where it grows almost spontaneously, it is considered almost indispensable. Why, the poorest negro would think himself poor, indeed, if he could not get okra for his gumbo soup. This club should take every effort to extend the knowledge of its value, and induce its extended cultivation, so as to cheapen the article, till it comes within the reach of every individual, as to cost and abundance. There is no vegetable that can be used in soup, which produces so much mucilaginous and nutritious matter as the roots of the okra plant.

Mr. Pardee said, that he had received from a friend at New-Orleans, some seeds of a dwarf okra plant, which does not grow more than two or three feet high, and is very prolific of branches and pods. He thinks it a valuable improvement for this latitude.

Dr. Arthur, of Philadelphia, had sent several tin cans of vegetables and fruit according to his patent, which consists of a solution of three ounces of gutta percha, or thereabouts, in one pound of common rosin, some of which is applied in a small channel surrounding the top of the can, which when warmed sufficiently to expel the air from the preserves, is soft enough to receive a tin cover, the edges of which are then pressed into the channel close down on the preserves. This adhesive mass, when cold, is hard, and impenetrable to air and moisture. These cans were opened by heating their tops and lifting them out of the rosin The peaches were tried by the members, and were pronounced to be very good, having retained an unusual amount of their natural taste. The tomato sauce was deemed *as good as new.* The advantage claimed, besides perfect preservation, is that the same cans can be repeatedly used for the same purpose, and the gutta percha rosin of Dr. Arthur is also equally adapted to suitable glass vessels.

Subjects for the next meeting, on the first Tuesday in February next, the 6th, at noon: "Alkaline washes for fruit trees," and "New plants valuable for cultivation."

The club then adjourned. H. MEIGS, *Secretary.*

February 6, 1855.

Present—President Pell, Hon. Robert Swift Livingston, Messrs. Pardee, Dr. Church, John Ireland, of Long Island, Leigh, Paul Stillman, Butler, Peter B. Mead, Rockwell, of Williamsburgh, Dr. Waterbury, Cumming, &c.—fifty four in all.

Judge Livingston in the chair; H. Meigs, Secretay.

The Secretary read the following papers prepared by him:

[United States Patent Office Report, vol. 2 for 1854—Extracts.]

GRASS.

The Ceratochloa breviaristata, cultivated by B. T. Iverson, Esq., of Columbus, Muscogee county, Georgia.

He says that its seed is nearly as large as grains of wheat; excellent grass to turn in; best for milk making and butter; makes the sweetest and yellowest butter. No frost hurts it. He sows it late in September, and on the 25th of November his 100 acre field has it from eight to ten inches high. Neither drought nor water seem to hurt it; will give from four to six tons per acre. All poultry get fat on the seeds. It needs no sowing again; enriches the land, besides grazing the stock and giving the hay. With rich culture it will yield *one hundred bushels of seed per acre.* Mr. Iverson sells the seed at *five dollars a peck!*

[From the Journal of Agriculture and the Transactions of the Highland and Agricultural Society of Scotland, January, 1855.]

SUBSTITUTES FOR THE POTATO.

Let the tubers of poisonous plants be examined, for the leaves of the potato are poisonous, and the tubers perfectly wholesome. Try the *Glycine Apios*, the *Saa-ga-ban* of the Micmac Indians. It is a perennial plant, with a twining stem, primate leaves, and a blue and purple flower. The root is tuberous, the tubers situated a few inches below the surface of the soil, and strung together by a strong ligament. They are not large, but numerous, in appearance resembling the common potato, and of a similar taste and odor. They are very farinaceous, and contain a large percentage of starch; also albumen, gum and sugar. It is a common plant throughout the Northern and Southern States of America.

Revue Horticole, Paris. [Extracts translated by H. Meigs.]

AUSTRALIA CLIMATE.

NEWS FROM THE ANTIPODES—A RIGOROUS WINTER.

It is not only in Europe that the striking irregularities of the season are noted. All countries are subject to them—the torrid as well as the frigid and the temperate. We borrow from the Gardener's Chronicle of May, 1854, as to New Holland, whose seasons are inverse our own. An amateur horticulturist, one of the colonists, M. McArthur, of Cambden, in New South Wales, writes to Mr. Lindley, of London, that a dry autumn, very unfavorable to vegetation, was succeeded by a winter of uncommon rigor. Frost began with the month of May, almost a month sooner than usual, and continued until the latter part of September, (five months,) with only four rainy spells, but which almost drowned us, especially the last rain, which was terrible. It caused great freshets, overflowing our lands to a vast extent, forming great lakes as it were. And in the meantime our mountains were covered with snow to the depth of many feet. The snow destroyed many of our animals by covering up their pastures. The Fahrenheit thermometer indicated in the morning 18 degrees frequently.

By comparing South Australia climate with the south of France, we are much struck by the similarity.

Manures peculiarly favorable to some plants.—Long experience has proved that *animal black* is particularly advantageous to tomatoes. Every one of those tomato plants to which I gave a handful of *animal black* was much more active in growth, and gave fruit earlier than any others. On the 9th of September, my tomatoes with this black are magnificent, while my others, manured with ashes, or colza oil-cake, and guano, have almost perished with the long drouth we have—the culture, soil, &c., alike in both cases. Colza oil cake, reduced to a powder and sown in the drills, for carrot seed, has a most happy influence upon the growth of the crop. A small quantity of the powder is sufficient. When the heat of the weather is severe, we must water the carrots.

I have used guano for cabbages with success. I put merely a *pinch* of guano to each stalk. It is best to mix the guano with something else before you put it to the plants.

CHARLES FOUSSET,
On the Lespinasse farm.

SWEET POTATO CULTURE.

Columbus, Ga., *Jan.* 16, 1855.

Hon. H. Meigs:

Dear Sir—On my return home last evening from my plantation, I found letters from Messrs. John F. Clark, of Washington city, H. Everett, of Philadelphia, and yourself, each alluding to the notice of my potato crop in the National Intelligencer, and requesting a statement of my mode of culture, &c. That *notice* was entirely accidental, and without my knowledge. My wife, visiting a friend, caried a few fine potatoes with her, and spoke of our success, (the unusual drouth considered,) without knowing that her husband had recently taken the *chair editorial*, and we were much surprised at the flattering puff in the next issue of the Enquirer. I am not given to the seeking of notoriety, and have no experience nor inclination in writing for the public. However, I shall not refuse your request, but in my humble way give you such information as you desire.

The sweet potato crop has long been a favorite one with me, as one easily raised, easily saved, and yielding more good, palatable and wholesome food than any other of the same cost. My crop on the plantation, is usually from ten to twelve acres, yielding from one hundred and fifty to three hundred bushels per acre, and are all used or wasted on the place—whites and blacks using them (ad libitum) during the fall, winter, and spring. I have often kept them until the new crop came in. They become sweeter the longer they are kept.

I will now give the manner of cultivating the crop you allude to. About the first of March, I opened the seed bank and had them all broken in pieces of the proper size to plant, (so that the sprouts should not be injured when ready for planting,) opened a bed four feet wide, five inches deep, and sufficient length, filled

it with fresh stable manure, (so as to generate heat,) covered over with soil one inch thick, and spread the potatoes close together over the bed, and covered them with earth three inches, and left them until all had sprouted from half an inch to two inches, (not through the surface.) Then had the lot (two acres) spread with a liberal supply of stable manure, together with six hundred pounds of guano and three hundred pounds of plaster, (all the manure worth about twenty dollars per acre;) turned all under with two large, strong mules, to a large two horse Allen plow, *close* and *deep*, so much so that one of my neighbors said I had *ruined* my land, checked it off three feet and a half each way, and drew up hills with the hoe as large and high as the check would allow. When all were finished, one hand, with a stick some four feet long and two inches in diameter, sharpened to a blunt point, proceeded to make a hole in the center of each hill about five inches deep. The bed was then carefully uncovered, seed taken up and dropped, one piece in each hill, and covered. They soon came up, (also a good coat of grass,) when we had our furrow run each way of the rows with a solid sweep, (a plow made of wide, thin steel, and of triangular form, eighteen or twenty inches, thus, $>$,) and which are used on a common rooter stock, and set to run shallow, (we use them in place of your cultivator,) which plowing shaved off the grass about half way up the sides of the hill; the hoes following shaved down the upper half. When the grass again came up, the vines were running, and were carefully turned into every alternate row, and those left bare were deeply plowed with a turning shovel running twice in each row, and throwing the dirt up to the hills; vines reversed, and the other rows plowed; then cross-plowed with very long, narrow rooters; the dirt then drawn up the hill with the hoe to its usual or first size, leaving the crown dished like a saucer, *carefully avoiding* the covering of any part of the vine. Should any portion be covered, it takes root, and *materially* injures its product.

I have raised six hundred bushels of the sweet or *Spanish* potatoes on an acre, of a seasonable year.

There are *several* varieties of the Spanish or sweet potatoes, also of yams, and two or more of the red; the yams more produc-

tive than the Spanish, and one of the red more so than the yams. The Buff Spanish, (the kind I am raising,) is as far *superior* in quality, to the yams, or reds, as your *improved grafted fruits* are to the common seedling, and so pronounced by all who have ate of them. I began ten years since, by selecting five bushels, as the hands were gathering some two to three thousand bushels, and have continued to select the seed, every one with my own hands, each two or three years, until I think they have no superior. If you are planting, and think the Spanish variety would succeed in your climate, it would afford me pleasure in sending a barrel of seed to your direction. Having never *sold* any, but given away hundreds of bushels, you need not fear their being *puffed* for *sale*, as too many (said to be) *improved* seeds are.

As I remarked in the beginning, I am unused to writing. You will therefore condense what I have written to suit yourself.

High manuring, *deep* and *thorough* cultivation, and an *early start*, on a sandy soil, is the secret of my success.

Most respectfully yours,

EDWARD T. SHEPHERD.

Columbus, Ga., *January* 20, 1855.

H. Meigs, Esq.

Dear Sir—Yours, enclosing Japan peas, came duly to hand, for which please accept my thanks. Enclosed I send you the genuine orange water melon seed. This melon is cultivated in all respects like the common melon, but it must not be planted near any of the melon family, or it will lose its peeling qualities. When ripe just cut through the skin as you do an orange, and the rind will come off without breaking the pulp. After which, by cutting between the lobes you may divide it without showing a seed, and it is not only beautiful but delicious.

Very respectfully yours,

CHAS. A. PEABODY.

Columbus, Ga., *February* 1, 1855.

H. Meigs, Esq.

Dear Sir—Yours of the 27th ult. and Japan peas came safe. Please accept my thanks, and a few seeds of my winter grass. It

is now very late to plant these seeds, as you will see by the circular enclosed, which is my mode of culture. I would reserve some, and sow in July or August next. Those planted now I would soak in a solution of guano and water (pretty strong) for twenty-four hours, or in water alone forty-eight hours, before planting. Fresh stable manure suits this grass, and I apply it turned under before sowing the seed. It is best to plant or sow these seeds pretty thick in the row. They require shallow planting and slight covering. The ground should be spaded deep and well pulverized. My grass has stood the cold in Virginia so far without injury. I do not see why it wont do as well in New-York. It stands cold here which kills wheat and barley, particularly while in bloom. I will, after a while, send you some seed of my summer grass which you will prize as a treasure. Should the Ceratochloa succeed with you, please let me know. The Japan pea is beautiful, but does it not require too much ground? I shall give it a fair trial, and hope for success.

Your obedient servant,

B. V. IVERSON.

Mr. Paul Stillman read an extract of a letter from his friend, Captain Edward Pinnix, of Quintay Ranch, Marysville, California, from whom he had received the 30 varieties of melon seed, distributed at the club the past spring. He wished to know the result of their cultivation here. He had himself succeeded in raising one the past season of 41½ lbs. It was of the variety wrongly called in the list he gave the club, pultoon, but rightly purutun (*poo-roo-toon*). It is, perhaps, the largest and best variety of the musk melon. The largest obtained in 1853 was 36 lbs. Mr. Stillman said that the seed he had reserved for his own cultivation had made him no return owing to the ferocity of the squash bug, which had been driven by the drouth from all sections to feed upon his vines, so that they had utterly destroyed them after large melons were formed on the vines. Captain Pinnix also informed Mr. S. that he had the past summer gathered from eight peach trees, three years from the bud, 3,975 peaches as fine as the best he had ever seen in New-Jersey, and that after he had thinned out above 300 from each tree.

Of 100 acres of wheat his average this year was 35 bushels. One half his field was badly affected with smut, which had greatly lessened his average.

The Ranch was located on the rich bottom of the Yuba river, near its junction with the Feather river.

INDIAN CORN.

Mr. William Lawton—I have received a communication from Mr. E. Sherman, of Orange county, in reference to his experiments for the purpose of improving the varieties of this great agricultural staple, to which I beg leave to call the attention of the club. Mr. Sherman has been making experiments for a number of years for the purpose of obtaining a variety adapted to our climate, and with increased productiveness of grain, and believes he has attained both objects. Out of seventeen varieties, he selected a small kind which produced from five to eight ears upon a stalk, "with small grains of every hue," and crossed it with the finest eight-rowed white variety. He continued this cultivation in his garden until he obtained the desired improvement. The small variety had twelve rows covering the cob to the point. The product from these is a large ear of twelve rows, of forty-four to forty-six hard flinty grains, covering the cob in uniform rows from the but to the tip. The cob is perfectly ripened and dry. These qualities show that the crop has matured in good season, and will not be liable to mould or mildew in the crib, having thus happily succeeded in obtaining a variety which gives its strength more to the grain or ear than to the leaves and stalk, (from three to five ears on a stalk), Mr. Seymour next introduced it into field culture, and finds, after three years experience, that it does not deteriorate. On the contrary, to use his own terms, the quantity of corn that can be raised upon an acre, by proper tillage, will fail to command belief. It may be raised to give two quarts to each hill if planted four feet apart, say 170 bushels to the acre. In 1853 he planted his corn in hills, about three feet apart each way, throwing in a shovelful of manure, and dropping on it from three to four grains. The product of this crop, as certified by his neighbors, was 160 bushels shelled corn to the acre,

for which he obtained the premium at the Orange County Fair, held 23d September, the same year.

Mr. Seymour is to send me early in the spring a quantity of this corn for distribution to the members of our association, having at present but one ear as a specimen; I shall divide it among those at this meeting, who may not be able to attend a few weeks hence.

Detailed accounts of the cultivation of this invaluable staple are annually reported to societies throughout the country, and premiums liberally distributed to successful competitors, for the greatest yield per acre, but I have seen no account of a systematic hybridization, for the purpose of obtaining a hardy and prolific variety, so as to increase largely the product under similar cultivation, which I consider of more importance, and would suggest, that some plan be adopted to produce competition, and to reward the successful.

ON THE EFFECTS OF THE SALT AND LIME MIXTURE ON VEGETATION.

Thomas W. Field, Brooklyn—Some of the uses of this compound have been overlooked in the discussion, and I desire to state, that the resultant compounds of salt and lime--viz: carbonate of soda, and chloride of lime—have the following offices in vegetation:

1st. Chloride of lime—the great disinfecting agent used in epidemics, to deprive the atmosphere of its malarious gases; absorbs ammonia and other nutritive gaseous elements, and holds them in combination for the use of plants.

2d. Carbonate of soda retains its causticity much longer than lime, and simply, as an alkali, exercises its decomposing powers upon vegetable fibre to reduce it to pulverulence, and capability of yielding its salts in solution, long after its fellow alkali, caustic lime, has become mild as a carbonate.

3d. Carbonate of soda, by its causticity, will destroy slugs, larvae of insects, cocoons, eggs and seeds of noxious weeds, wherever it comes in contact with them, long after lime has lost that power, by uniting with carbonic acid.

4th. It will, to a certain and limited extent, take the office of potash; an indispensible agent and component of vegetation, but when the latter is deficient in quantity, soda, if present, is taken up in larger quantities, being similar in action; for instance in reducing silex to soluble silica, so as to be assimilated by plants.

5th. It is valuable as a wash for trees, when diluted to a degree of strength, not deleterious to vegetation, say one pound to two gallons of water.

6th. By its properties of deliquescence it attracts moisture to plants, and prepares soils to resist drought, by storing up the atmospheric vapors, and yielding them slowly to plants.

7th. Though not properly affecting its value as a vegetable aliment, yet it should not be overlooked, that chloride of lime, formed by the slacking of caustic lime with salt water, and spread over the ground, acts as a disinfectant upon the soil and the atmosphere, absorbing the poisonous sulphuretted hydrogen, noxious alike to vegetable and animal life; nitrogenous or ammoniacal fumes, that produce the dreadful biliary diseases, are neutralized and rendered inert by its influence.

NOTES OF POINTS MADE IN DISCUSSION AT THE FARMERS' CLUB, FEBRUARY 7, 1855.

(On Dr. Waterbury refering to Prof. Mapes' remarks on the value of charcoal, and suggesting that something was due to the ashes, and that chip manure might prove a good substitute, as it would contain both the ashes and the carbon.)

Mr. Field said, that carbon is produced in the soil by the decay of vegetable fibre, as perfectly as that which is the product of combustion. It is well known, that all decomposition, decay, or rust, is only combustion; that the union of oxygen with all substances is indifferently flame, or decay, combustion or decomposition. Therefore carbon is equally the product of both processes, burning and rotting; and vegetable fibre added to the soil, in the shape of manure, finally becomes carbonaceous.

On the subject of alkaline washes for trees, Mr. Field said, that the woolly aphis was one of the most noxious pests of fruit trees.

This small scaly insect secretes itself beneath a woolly scale or cocoon, and adheres so firmly to trees, as to be scarcely capable of dislodgment. A single insect in a few weeks covers trunk and branches with an innumerable multitude. If anything will destroy this pertinacious and destructive pest, it will prove a great blessing to fruit growers.

Prof. Mapes says, that carbonate of soda wash will effectually put an end to their depredations.

(The subject of animal charcoal having been mentioned, Prof. Mapes said, he had used two tons of sugar refiners' refuse bone black, on a quarter of an acre, without perceptible benefit on account of the insoluble phosphate composing it in great part; but 400 lbs. of superphosphate made soluble by sulphuric acid, fitted an acre for a good crop.)

Mr. Field said, that one word mentioned by Prof. Mapes, comprised the whole secret of vegetation—solubility. If it were possible to make the farmer once comprehend this requisite of the growth of plants, the lost kalon, the great mystery of vegetable sustenance, would be discovered; plants cannot take up solid particles, however small. Animal charcoal is principally composed of the simple phosphate of lime, which is too slowly decomposed, to yield its phosphoric acid in solution, though the latter is an important agent in vegetation. The phosphate must become superphosphate, to yield its nutritive powers readily by solution. Wheat refuses to stand erect, and ultimately to perfect itself upon some sandy soils, although it needs precisely their principal component, silex—simply because that silex is not soluble.

No man can make his field fruitful, by merely adding sand for the silicious material of plants, nor insoluble phosphate, to yield the indispensable phosphoric acid. Nor will feldspar thrown upon a soil, robbed for years of potash, restore it to fruitfulness, although composed largely of that salt. But phosphates, sand and by chemical change, give up in solution their respective salts, and soils abounding in their insoluble compounds, may be forever barren.

President Robert L. Pell said that lime is the oxide of calcium, and as such should not be exposed to atmospheric influences, for that it absorbs water and becomes a hydrate of lime, then, after carbonizing, returns to its original state of carbonate of lime. It destroys not only slugs and worms, but even kills their larva, acting upon organic matters it may encounter and decomposing them.

When lime is placed upon a sandy loam, it quickly divides into powder, sinking into the soil, and forming a layer of hard calcareous matter, which becomes almost impervious to moisture. These lime floors may be brought up by deep plowing, or by sowing clover, the roots of which penetrate the lime, and return it to the surface through their stems; it causes loose soils to become stiff, and mellows stiff clay; supplies inorganic food to plants, neutralizes poisonous substances in the soil, transforms inert matters into fine soil, and facilitates all kinds of decomposition. He had found lime and salt mixture admirable as a top dressing, mixed in the following proportions: Sixty bushels of lime with thirty bushels of salt in a dry state, placed under cover for ninety days, and use sixty bushels to the acre; a better composition is to add sixty bushels of muck, during the decay of which new combinations are formed, such as nitrate of lime, chloride of calcium, gypsum, &c.

Salt without lime is advantageous to soil; nearly all plants contain it, and furthermore, it preserves them from injury by frost, as salted lands are only frozen by excessive colds; cabbages and similar plants in salted grounds will appear flourishing, when the same plants on contiguous unsalted land will be frozen to a state nearly allied to death. It retains moisture to the soil, and likewise absorbs it from the atmosphere. It is formed of chlorine and sodium, and is therefore a chloride of sodium; it is without smell or bitterness, melts in a red heat, and is volatilized in a white heat.

In using salt upon cereal grains and the vegetable productions of the farm, at the rate of nine bushels per acre, it has answered expectation, and the crops have been improved. Thirty-five

bushels to the acre will destroy all weeds, kill coarse grass, and in fact all vegetation for a time, but when the reaction takes place the ground will be found perfectly sweet, and capable of producing superior crops of any description, provided the necessary chemical ingredients are present, and cattle will seek the portion of land so treated in preference to all others for several years after. In gardens it will prevent crops from clubbing; placed in water containing cut flowers it induces them to look bright and flourishing, long after those in water without salt have faded. Cuttings intended to be sent to a distance should always be kept in salt water before they are packed. I close my remarks by asserting, that lime and salt are indispensable to the fertility of all soils, and by the eternal evaporation from the mighty oceans, salts are distributed over the whole earth, and carried by God's rain to the roots of all plants.

Washing fruit trees with alkali, being one of the subjects of the day, Mr. Pell remarked, that the alkalies, potassa and soda, are extensive products of the mineral kingdom, but are never discovered in a pure state, but combining acids—the first, potassa, with carbonic acid is known as the soda of commerce; the second, soda with carbonic acid, as pearl ash. Either potash or soda form an admirable wash for the trunks of trees, destroying all insect life, and causing the epidermis to fall off, leaving the trunk perfectly smooth, soft and green, and causing the tree to assume a beautiful appearance. He generally made use of strong soaps, applied to the tree with a whitewash brush, immediately after scraping them thoroughly. After the first heavy rain the potash finds its way to the roots, and assists nature to form the fruit.

DETERIORATION OF THE FRUIT ON LONG ISLAND

Thomas W. Fields, Brooklyn:

After several years of acquaintance, merging occasionally into the labor of investigation, the writer is forced to believe that the vaunted supremacy of Long Island in fruits and farms is a myth.

The native soil of the Newtown pippin refuses to yield any longer the exquisite juices and rare perfection that distinguish

the king of apples above its fellows; and it is scarcely possible for the lover of fine fruit to conceal his chagrin on seeing the cracked, half-charred specimens which now represent that noble fruit.

We have known horticultural pilgrims make their pious journeys to Newtown for the purpose of seeing the pippin which bears its name in its native excellence; and the grievous disappointments with which they looked upon the products of its orchards was both painful and amusing.

Truth it is, that some entire orchards will not yield for years a perfect apple; and particularly when grafted for the Newtown pippin. In some seasons not a bushel of passable fruit can be obtained from a hundred trees, and at the best not as many bushels from that number of well-grown and thrifty trees. Loaded with blossoms in spring, the orchards give fine promise of a rich harvest, but as the summer advances one side of the apple opens with unseemly cracks, and then gradually becomes covered with a substance resembling burnt leather, worse than the fabled apples of the Dead Sea, for the ashes are on the outside. The peach tree is an exotic on Long Island, that obstinately refuses to yield the fruit, which tradition and the Jerseyman relate of it, and horticulturists will soon place it with the orange in the conservatory.

The melting Vergaloo, once exported from Long Island to Albany, and the river towns by sloop loads, has ceased to afford anything more attractive in taste and appearance than a last year's butternut, or the pippin abortion, which it uniformly resembles—the same half-burnt skin, covering a fruit that never ripens into endurance.

Twenty years since the tall shapely trees that still shade many a door-yard and garden-ground bore the queenly fruit that rivals all we dream of the Hesperides. Scarcely one of those paternal overhanging Dutch roofs, along the lanes and crooked roads of the outer wards of Brooklyn and Bushwick, but is shaded by fine tall pear trees of a dignity of dimensions and carriage that has something burgher-like, and staunch as its Dutch owner; but rarely does any but the winter bell (a savage old variety) hang upon its branches.

Pass along the Clove Road—the Hunter Fly—the Cripplebush Lane, or the Dutch Kills Turnpike, and although you may see hundreds of tall thrifty trees, their owners will tell you, with a quaint mystery, that they do not bear now. For a long period, twenty years since, the towns of Brooklyn and Bushwick were wont to send forth from these same trees wagon-loads of the finest Vergaloos with as little care as they now do potatoes, and at far less cost. The writer has often been shown a handsome tree, by Mr. James Debevoise, of Bushwick, from which he had, more than one season, taken twenty bushels of the White Doyenne or Vergaloo—but last summer, tired of its cumbering the ground, he made the once generous old Burgher lay its thrifty branches on the wood pile, and those arteries which once elaborated the rich sap into the vinous fruit, now make the pot boil.

Last summer we visited the famous orchard of Lawrence pears, planted by the Messrs. Parsons, of Flushing, in 1848, and chronicled by the enthusiastic Barry in his Fruit Garden.

Eighteen hundred pear trees, seven years transplanted, of a new and seductively described variety. The story had enchanted our imagination more vividly than twenty years since did the Arabian Nights. Conning it over for two or three years during the season of frost and snow, we last summer determined another season of fruits should not slip by without our beholding a collection of golden pears our imagination pictured so vividly.

Last summer, or rather fall—we repeat it—we went to Flushing by the stage and returned by the steamboat, with the only specimen of Lawrence pear in our coat pocket that Flushing afforded that year—and that obtained from the garden of a kindly Quaker, who pitied our disappointment. On the one thousand eight hundred trees not a solitary pear and scarcely a leaf appeared.

Our horticultural zero was reached, and we hovered between that and the freezing point for a calendar month; in fact, thought of selling off the two or three thousand trees we had imported from France at cost. Luckily our Yankee love of analysis was excited to research, and we recollected that half a dozen trees,

three years planted and well cultivated, had produced more already than we had reason to believe the Flushing trees had in seven.

Comparing our treatment with others' neglect—analyzing the soil, and earnestly desirous of coming at truth, we feel confident we are not far from the sly jade. Thrifty growth of peach, pear, and apple, it must be recollected, is invariable wherever ordinary care and cultivation is bestowed, and this fact does not make our problem easier of elucidation.

To detect the varied causes of this decline of fruiting in thrifty trees, and point out a sovereign remedy—a sort of horticultural panacea—requires a careful chemical analysis of the soil, the fruit and the tree, not only, but an intelligent study of the hygrometric and atmospheric conditions attending the subject. To do this patiently, until success waited upon investigation, would require qualities we could not bring to the task; but some thought and much wasted labor have yielded us little save these thoughts and conclusions. Poor as they may be, the reader obtains them cheaper than the writer.

The soil of Long Island, varied as it is by every knoll and hollow, is universally deficient in alumina or clayey material. This, the great absorbent or retainer of the gaseous and liquid elements of vegetation, has never been present to any extent in the soil, while carbonaceous matter, which assumes its office, has gradually been wearing away. Nothing now prevents the immediate passage through the porous soil of the aliment of plants contained in the manures added to it (it must be said with no stinted hand) as soon as the rains have dissolved their nutritive salts. Potash and soda, that enter so largely into the composition of fruits, and bark, and ligneous fibre, fitting the sap by chemical changes to perform its office, and become the juice, or leaf, or twig, or flower, have, by their complete solubility, gone into the lower strata too deep for resuscitation.

Phosphoric acid has followed downwards, or united with lime to form the strong bones of the beeve—has walked away to the

shambles—or buried with the worn-out old horse, below the stone heap, or drifted out on the salt meadow.

The nitrogenous and carbonaceous matters so profusely bestowed upon the soil by the farmer, produce, it is true, the quick-growing and broad-leaved vegetables of the market gardener; but their stay in the silicious earth is too short for the limited quantity of inorganic salts to fit them for the pabulum of fruits.

It is well known that manures, to produce appropriate action upon trees, must have undergone the influence of fall, winter, and spring upon their particles. Here no restraining carbon or alumina retains the ammonia from volatilizing into the atmosphere, or in solution as a carbonate, traveling in company with the potash, and soda, and phosphoric acid, down below the reach of roots of trees, and being lost. The fact is, the farmers and fruit-growers of Long Island have not been niggard in their supply of food to plants and trees—(it is contrary to the religious creed of a Hollander, and grossly heretical to stint anything in provender)--but the soil has changed from its original condition.

The carbon of the soil, nearly indestructible as it is, has worn away at last, and elaborated into woody fibre of plants. While the little clay once existing there, following the law, that the smallest and weightiest particles work downwards—has passed below the strata where the roots seek nutriment. What they obtain is seized, while the rich salts are hurried by them through the loose and spendthrift soil. There is little difficulty in reconciling the apparent inconsistency of the two facts, that soils will produce thrifty growth of wood, and refuse to support the fruit.

Woody fibrous growth, it is well known, is produced early in the season; in truth, there is an almost imperative law that forbids the simultaneous production of fruit and fibre. The latter is provided for while the soil is full of juices, and before the arid summer has burned and wasted them.

No condition of the soil is so favorable to the retention of moisture alone, as an abundance of carbon or alumina. They act as a

mulch, shielding the roots from the parching rays of the summer sun.

By the last of June, growth has ceased, and seldom do the trees retain even their foliage unimpaired through the succeeding month, when the starved fruit droops for nourishment, and never recovers sufficient vigor to ripen perfectly.

The truth of this is recognized by the Long Island farmer, who never plants root crops to grow through the summer. Potatoes are hurried into the ground almost under the snow; experience has proved that they will not mature and produce tubers profitably when planted in the season most successful in more clayey soils. The beet and carrot are seldom successful.

The Russia and flat turnip scarcely commence their growth until cold nights have come.

Every vegetable as well as fruit, seems to recognize the want of carbon and alumina.

These must be added, costly or economically, the law is imperative, if the Long Islander would raise fruit once more. Providence, or nature, if your creed likes it better, rarely shows us a want without a means of supply.

The plantain-weed grows wherever a venomous reptile crawls. No part of the world is better supplied with deposits of carbonaceous matter, spread over some part of almost every square mile of its surface, than Long Island, and with but little labor fitted to become both the nutriment and the retainer of nutriment for plants.

Professor Mapes announced that the new digger, by Gibbs and himself, was ready at his farm in Newark for trial, and when the frost is out of the ground he will put it in operation for the examination of gentlemen who desire it. This digger pulverizes the soil deep. The Professor has placed his newly-invented sole plough in advance, but connected with the digger. This small plough lifts the soil a little, so that the action of the digger is more complete The whole work, as the digger advances is

about four feet wide and fifteen inches deep, a thorough pulverizing.

Questions adopted for the next meeting: "New useful plants." "Spring treatment of grape vines." "Fruit trees, especially the peach." "Hot beds." "Making gardens."

Professor Mapes recommended highly the Stowell corn for man and cattle. Mr. Nathan Stowell, of Burlington, N. J., can supply the seed.

The Club adjourned to Tuesday, February 20, at noon.

H. MEIGS, *Secretary.*

N. B.—Seeds of the Seymour corn and orange water melon were distributed among the members.

February 20, 1855.

Present—Mr. President Pell, Professor Mapes, Messrs. Van Liew and Winkle of Jersey, Gilman of New Hampshire, Paul Stillman, Bowman, Phœnix, Dr. Waterbury, Dr. Newton, Peter B. Mead, D. Boll, Cummings, Toucey, Pike of Jersey, Youmans, Paine, and others. Seventy members in all.

President Pell in the chair.

Henry Meigs, Secretary.

The Secretary read the following papers translated or prepared by him.

Dr. Boll presented an oil painting of the Dioscorea Batatas, now introduced partially in France. Mr. Boll has recently returned from a visit to Paris, and has some of these Batatas for experimenting himself. He gave the Club an accurate description of this plant.

Mr. Meigs, the Secretary, read the following translation made by him:

DIOSCOREA BATATAS—(*Igname of China*).

New observations relative to it.

We live at a time when it is not necessary to struggle for ever against popular prejudice as to a new and useful thing in agriculture. If some resistance is experienced in our country population, yet enlightened men are now numerous enough everywhere to encourage a new and useful plant.

The great amelioration in our State by the use of the most perfect types of a race, borrowed from our neighbors and elsewhere, are incontestible proofs of advance. Culture, drainage, &c., are so many happy reforms in our domestic affairs, and in our comforts and manners.

We do not flatter ourselves with making popular at the first onset the *Igname of China*, but we do hope that its introduction to general use will not be opposed, as the pota to was, *for nearly two hundred years!* Its malady is, we trust, but temporary. Malady might assail this new batatas, but perhaps not, so that we may henceforth not fear a famine.

Five years ago the first Dioscorea Batatas was brought to us. It has attracted attention now almost everywhere, and the calls for them to plant are numerous from all quarters.

My mode of cultivating them :—Towards the middle of April, when I believed that we should have no more frost, I planted some of them in pieces and whole, in good light garden beds, at the Museum of Natural History. I set them about twenty inches apart every way. This was wrong, they should have been set much nearer together. The future alone will teach us what effect our climate may have upon it. All that I can now say is, that my plants have this year (1854) grown well, their long shoots being very vigorous and covered with thick foliage. They produced many flowers (all of which were male) about the beginning of August. At the end of August the growth of stalks and leaves ceased, and they assumed that yellowish hue which indicated, after the middle of September, the approaching maturity of the tubercles.

I set apart some square feet of the plants for other experiments, while two of my lots were covered, one with strong poles about ten feet long, another with poles about 7 or 8 feet long. The branches and stalks of the igname twined around these poles as beans do, and soon run beyond the length of their poles.

In the third lot I let them have their own way, and the vines did not root at their joints, and twisting together, grew nearly as long as those on the poles.

The tubers which I planted whole gave remarkably vigorous plants, each of which gave a new tuber, of these, two were quite large. When pulled one weighed nearly three pounds (1 kilo. 360), the other 1 kilo. 160. The third was injured by the insect *Hanneton*. The original batatas which I planted were still on, very much wrinkled. The beds of cut tubers did not produce well, weighing on an average not over a quarter of a pound.

Of the whole, the result was from twenty-eight plants, each giving one tuber; on an average the tubers weighed about five ounces each. (345 qrs. 18.) We found on the whole from fifty-seven plants, seventeen kilogrammes, or nearly forty-three pounds weight of tubers.

The result of these experiments shows, that a hectare can produce 6,000 kilogrammes of igname, or that an acre may yield something like two hundred bushels. We think, from what we have seen of the growth, that ten inches apart every way will be room enough for the root—for this plant seems to live upon the air, by its vines and leaves. The product of tubers was nearly double our late usual crop of potatoes. These ignames are from ten to twenty inches long; the upper third of the roots very slender, about the size of our little finger. I think that this part should be reserved for planting. The digging of them is a difficulty. In China they always plant them in sandy soil.

I do not hesitate to prefer the Chinese igname to the common potato for quality; I believe the igname to be more nutritious. The flesh of it is as white as snow; it has no apparent fibre in it. By boiling it becomes so tender, that under the lightest pressure it becomes a paste, like that made of the finest wheat flour.

Cooked by steam, or roasting in hot ashes, it has the appearance and taste of the best of our common potatoes. Two pieces of the root, as large as the common Dutch potatoe, were boiled together, with a potato of same size, and the ignames were done in ten minutes, while the Dutch potato was twenty minutes n cooking. This is a valuable property, saving time and fuel, and that is one reason why the potato was so much valued originally. And this igname keeps well from one year to another. The igname has been successfully cultivated in Algiers.

Many of the dioscoreas have the property of multiplying by these bulbs, which become detached from the plants when at maturity.

Prof. Mapes spoke of the very excellent qualities of the Stowell evergreen corn, and invited members of the Club, to call at his city office, 143, Fulton street, and accept some for trial.

The Secretary remarked, that he had suffered a loss of some plants in hot beds, by burning. Large drops of water accumulated on the under sides of his glasses. and injured by the focal rays of the sun, many young, vigorous dahlia plants, soon after the first introduction of this seed from London

He saw at an agricultural fair in New Haven, a few years ago, potatoes, three inches in diameter, grown that year from the seed, by very early planting in hot bed and transplanting to open air. He had raised new potatoes from the seed balls, but it was three years before they attained a fair size. Those were so prized as to bring *five* shillings a bushel here, while the ordinary potatoes in this market commanded but *two* shillings a bushel. Mine were admirable for their quality, but in a few years got the black heart and waxy qualities.

Prof. Mapes raised sweet potatoes, by laying them in hot beds, hardly covered with soil; putting out abundant shoots, which he pulled off and set in the ground in open air; thus have a very large supply of shoots from few potatoes.

Paul Stillman observed, that, by such management of the sweet potato, four hundred bushels have been obtained from one potato.

CAULA RAPA.

Professor Mapes said:—Mr. Chairman—This seems to be a hybrid between the cauliflower and some of our turnips. We have thirteen kinds, of some of which I have grown large crops. There is now a white one, which, if gathered when young, is equal almost in flavor, if thoroughly cooked, to the cauliflower, and has almost the keeping qualities of many kinds of turnips. It is extremely white, and resembles what is called the White Vienna. Some of the various kinds yield very large crops; are not subject to any of the difficulties of the turnip; are not attacked by the fly; may be transplanted, and always succeed. They grow full as close as turnips. I have no doubt they will yield a thousand or twelve hundred bushels to the acre. They might be profitably raised for market, and are superior to the turnip for feeding purposes, because they do not give the milk the bad flavor that turnips, when not fed immediately after milking, are likely to communicate. This vegetable should be introduced more generally. I have the seeds of the better kinds, and I will bring some for distribution, if possible, at the next meeting of the Club.

HOT BEDS.

J. Payne Lowe.—Mr. Chairman—This subject is of much importance to the market gardener, not only because he is thus enabled to have plants for his own immediate use in due season, but also for the reason that he can obtain high prices for those not required by himself, if marketable at an early date.

It is a useful practice, and indeed economical, to have the necessary amount of earth collected in a heap, say latter part of August, so that it may be ready for use when required in early spring at the time of making hot beds. This heap, during the winter season, in consequence of frequent freezings and thawings, becomes finely pulverized, and not being trodden down, or in a compact state, the atmosphere can freely circulate through the mass, and in so doing deposit ammonia, etc., which will prove conducive to its fertility.

Next in order I shall speak of the proper covering for sashes, for the reason that this is generally provided during late winter, as preparatory to the making of hot beds. Moss, hay, and refuse material, are frequently, but injudiciously made use of; for during the removal and replacement of such substances, at times necessary to give air and light to plants, small portions, by accident fall upon them, which soon undergo decomposition, and the plants being too tender to withstand the produced effect, very often droop and die.

Mats are doubtless much better as a covering to prevent the effects of frost, than the materials already spoken of, for the objections in the one case are not applicable in the other, and the best kind as well as the most easy to construct, are those made by almost every gardener. Two men accustomed to such work, can make during a day, from six to seven mats, six and one-half feet long by five feet wide, and the mode of operation can readily be understood. A coarse frame of the required size is procured, and from four to five nails, according to the size of the mat required, and at equidistant points from each other, are driven in each of the end boards, about one and one-half or two inches from the inner margin. The frame is then rested against a wall or other convenient place, and a piece of strong twine is made fast to the first nail, in order of those at the top board, and is then continued down to the opposite nail of the end board, and there made fast; the twine is then continued upwards, and brought down again without being secured, for the purpose of measuring a length twice that of the mat intended to be made, and is then rolled upon a short piece of stick with slit in the end, in which the twine may be placed to prevent its unravelling, when it shall have been wound up to within one and one-half feet or two feet of the nail of the lower end board. A like arrangement of the twine is made with the other nails in succession. Then one man, each side of the frame, takes a small quantity of straw in his hand from a heap, necessarily near by, which had previously been arranged evenly for such purpose, and places it over the nails of the lower part of the frame, permitting the ends of the straw to project, say three or four inches beyond the side line. His com-

rade upon the opposite side does likewise, and these are looped in by means of the pieces of twine already spoken of, and the operation is so continued until the mat is made. Rushes would be a better material for this purpose than straw, etc., for they will not so readily soak wet; but in their absence, wheaten or rye straw might be used in preference to hay or other short material, because of its length and evenness.

In due time the necessary amount of horse dung should be saved, and it should be borne in mind that the richness and heating quality of this manure will depend much upon the food given the horses from which it is produced. If they have been highly groomed, a considerable part of their bedding, which generally accompanies the manure, should be mixed with it, so that the beds afterward to be made may not be too hot.

The use of spent tan is frequently desirable, and especially so where it can be procured cheaply. Professor Mapes, speaking of this material, says:

"Gardeners often find that their hot beds lose heat before the season is sufficiently advanced to part with their use. By mixing with the horse droppings a quantity of spent tan, they continue them in heat long after the horse manure has ceased to be active, and by such an arrangement, the slowly decomposable tan is rendered an efficient manure for the next season's operations; for when properly decomposed, no manure is more rich in the earthy salts than the decomposed bark of trees. The large quantity of carbonaceous matter resulting from its decomposition, renders it retentive of ammonia, while its free, loose character, causes soils, otherwise too compact, to be free and fertile."

As every person present is doubtless familiar with the construction of hot bed frames, I shall not treat this part of the subject in detail. It may be well to state, however, that the double board system, for the sides, containing a space of confined air, which is one of the best non-conductors of heat, is now fast coming into use; for by its means there is a more evenness of temperature kept up. The mistake of cutting the glass for the sashes square,

is very frequent; I will quote Prof. Mapes on this point, as his explanation is very clear. He says:

"Sashes should never be made with square ends to the glass; where they lap the water will remain, sometimes in large drops or globules, forming lenses; the foci of which, from the heat of the sun, destroys plants; but, if the ends of the glass be slightly curved, but one drop of water can remain, and thus the joints are always clean and free from the objection before named."

The best position for a hot bed is that which will give it a south-eastern aspect, so that the plants may benefit by the morning sun. Decision being made as to the location, the frame is placed upon the ground, and a mark made around its inner sides; the earth is then generally dug out to a depth of some 18 inches. The manure, having been previously well intermixed, is placed in this receiver, and continued to a height—say of 1½ feet above the surrounding soil, or higher, as in the case of preparing a bed for egg plants. Indeed, the height will depend much upon the quality of the manure, its compactness in the bed, as well as the temperature required. The frame should then be placed on top of the bed, and more manure thrown in, but leaving a space between it and the glass, of about 12 inches. Before putting in the soil the bed should be covered up, by means of boards and mats, until it shall become sufficiently heated. The mats and boards are then removed, and about 7 inches of soil placed on top, which should be made very even, and not in a slanting direction with the sashes; for in such case, at the time of watering, or heavy rains, if there be a leakage on top, the streaming of the water would be hurtful to the plants. The sashes are now slid on and the mats are placed on top, and a day or more elapses, as may be required, so that the soil may have its temperature increased sufficiently, before sowing the seed, which may be permitted to become rather warm; for such will have a tendency to destroy many of those insects that feed on young plants. After this the covers may be taken off, to permit the escape of steam, and drills are then made by means of the garden rake, over which the seed is scattered broadcast, and the rake is then used to cover it in. Some persons prefer not to make drills, but scatter the seed, and then sift some fine soil over it.

Care should be taken to place a label to each bed containing a different kind of seed.

It should be remembered that after the plants shall have grown to a certain height, it will be necesssary to slightly elevate the frame to give them room; the object in not having it elevated too high, in their early stages of growth, is to have them in closer proximity with the sun's heat and light.

Young gardeners should make use of a thermometer, to indicate temperature, which may be hung inside of the deeper of the two side boards of the frame, so that when a person stands in front of the bed, it will be opposite to him.

From the time of the seed germinating, until the plants arrive at maturity, much care is needed for a very slight frost would be likely to prove injurious; but during mild days they should be permitted to have plenty of fresh air, and generally a slight opening to let out steam; for if the bed overheats during the early growth of the plants, they will grow too rapidly, and consequently be very tender.

The proper temperature of the inside air is considered to be from five degrees to ten degrees Reaumer's thermometer, when positioned as described.

After the plants shall have somewhat grown, they will be likely to require watering, and care should be taken that the apertures of the rose of the watering pot be very small, so that the water, in passing through, may fall gently upon the plants. If the weather happens to be very cold at the time they require water, it will sometimes be necessary to add a little hot water to take the chill off that about to be made use of. Moreover, during cold weather, it will be necessary to water at noon, or soon after; but if mild, this may be done immediately before sunset.

IMPROVEMENT OF THE MIND.

Prof. Mapes—But few persons ever reflect on the means by which they may improve their general ability for increased thought, while all agree that the human mind is susceptible of such im-

provement, and by no class of citizens is this subject more neglected than by farmers.

The farmer, beyond all others, should have clear powers of observation, so as readily to observe and apply nature's laws. His vocation is the root of all prosperity, and until the farmers of a nation are progressed to the highest power of observation, the country cannot rise to the highest rank.

Let us examine this subject as applied to an individual case, and the means may possibly be ascertained of arriving at the desideratum.

The usual argument in favor of a thorough and conventional education, although admitted, is not practicable. Farmers cannot be mere scholars; the vigor consequent upon their mode of life, is not of a kind to render them capable of becoming mathematicians, nor of availing of that part of the usual progress having a mathematical basis; but still we argue that no class of men are so capable, when properly directed, of availing of processes by which the more useful class of facts may be attained.

Lord Brougham has justly remarked: "That mathematical truths may be arrived at by thought alone;" and he says—"any man *may*," he does not say *will*, "by the process of thought alone, arrive at the solution of any problem in mathematics, by the same process of thought as that by which he knows that 2 and 2 makes 4." "But," says the learned gentleman, "no man can know by thought alone, that a stone let fall from his hand would descend to the ground." He knows this fact from *observation*, and not from *thought*; for if he had not seen the law of gravitation exercised in some way before, he could not by any thought of his own, tell if the stone would fall, rise, or float at the level of his hand. He knows this fact by example, and not by thought. The means of such knowledge is not inherent in man. Gravity is a law of God, and as such is only to be learned by observing its development in nature. We have cited this example only as a basis, and will now proceed to give a few other incidents, and then to show the application to our present argument.

All will admit that some men profit by observation more than others, while but few know the means by which this power of observation may be increased. As examples of this absence of observation, how few farmers know that cows and sheep have no upper teeth; how few are aware that cold water will dissolve more salt or lime, than hot water. Does one in one hundred, know that a gallon of water will dissolve more plaster of Paris than it will of slacked lime, that has been long enough exposed to the atmosphere to become carbonate of lime? How many know that water is at its mean of size when at forty degrees of heat, that if cooled below that temperature it swells, until it becomes ice at thirty-two degrees, and if heated above forty degrees, it also swells, until it eventually becomes steam, thus occupying more than 1,700 times its original space? Still all these are facts, and to minds generally observant, they are well known to be true.

The science of farming embraces all nature's laws, and the habit of observation will soon render the farmer ready to recognize these laws in all their useful applications. Let him know enough of chemistry, which he may do by one week's reading, to comprehend the various changes that the integrants of the soil undergo to enable them to enter the plant, and he will soon observe the fact that these chemical changes must include the ability of being dissolved in water before the plant can receive them. He will also soon find that water, in its pure state, will not dissolve the necessary quantity of all these materials, unless it contains carbonic acid, and this will necessarily lead to his understanding from whence this gas is obtained, and why it pervades the atmosphere. When he observes that water from a spring, applied to plants in time of drouth, will not produce the same amount of improvement as is received from a similar amount of water falling through the atmosphere in the form of rain, he will soon understand that the rain water comes charged with some ingredient from the atmosphere which the spring water does not contain, and the slightest examination informs him that this is ammonia, and that it is received in the atmosphere from the decay of former crops, animal exudations, &c. The slightest exercise of the mind in the observance and application of the commonest truths of

nature's laws will capacitate it for another step in progression; for the brain, like the arm of the blacksmith, or the leg of the dancing master, must increase in energy at least, if not in size, by healthful use, and this use is a free observance of God's laws as displayed in the progression of nature.

All have observed that the inhabitants of the country have this power of observation to a greater extent than those whose tastes lead them to become inhabitants of large cities, and to engage in mercantile pursuits. Indeed, this fact has given rise to many anecdotes, such as the boy who, when asked which was the direction of up stream, ascertained the fact, and answered the question by throwing a stone at a frog, then remarking a frog always jumps up stream when disturbed.

The Yankee captain who visited Sir Joseph Banks, is another example of this power of observation. Sir Joseph said, "You appear, sir, to be an observant man; do you know if the crocodile really cries to entice travellers, as has been stated?" "No," says the captain; "he cannot cry, he has no tongue." "No tongue!" said Sir Joseph. "No, sir; he has no more tongue than an elephant." "Has an elephant no tongue?" "No, he has no use for a tongue; he has a trunk." "Pray, sir," said Sir Joseph, "how did you arrive at these facts?" "Well," said he, "I saw a stuffed crododile in a doctor's shop, and I saw an elephant in a menagerie, still thousands of others might have seen the same crocodile and elephant without ascertaining the same facts." These anecdotes may not seem pertinent to our argument, but they are so. Let any farmer devote the evenings of a single winter to the reading of Geology, Entomology, Chemistry, Natural Philosophy, and Natural History, and apply his acquired knowledge as an amusement, while pursuing his vocation during the following summer, and he will find himself able to observe and comprehend thousands of incidents connected with natural law, which would before have passed by him unobserved. He will then see and understand that the soil is but a debris of the rocks, that in its original formation this occurred from the combined influence of sun and air, and changes of temperature by freezing and thawing, in rendering these rocks a soil. He will

see how the convulsions of nature have mixed the soils of different localities; he will see, also, that the earliest vegetable growths were necessarily grosser sorts than those now produced, and that they by receiving carbon from the atmosphere, for the carbon originally must have existed there in immense quantities, in the form of carbonic acid, by their decay deposited it in the soil, thus improving its quality and rendering it fit for the development of a more advanced class of vegetation. He will also see where and from what causes animal life progressed, and can trace its progress. He will clearly understand that such vegetable matters as were consumed by animals merely change the arrangement of their particles by such process, and that no one particle was put out of existence, but that by the decay of this animal, and the change of the arrangement of the ultimate particles, both of themselves and their food, that they re-enter nature's great storehouse, the atmosphere and the soil, in a progressed condition; that thus both plants and animals have progressed to their present state.

He will next be able to observe why deeply disintegrated soils can never suffer from drouth, because he will know that when water is absent from the soil it is present in the atmosphere, and will be deposited on the surface of colder particles, at greater depths than can be reached by atmosphere when attempting to percolate shallow plowed land. He can trace the action of this moisture and its office in the soil; he can know what amendments are required to replace those which he may find to be deficient; and, indeed, he can render himself doubly happy and a better servant of his Creator, and his vocation ameliorating to his fellow man. All this must occur if he knows so much of nature's laws as will give his mind the first ability for closer observance, and his progression as an individual will be the natural consequence of its exercise. All this does not call for the tedious exertions of thought as practised by the mathematician and the merchant, but merely for the culture of the power of observation to see truths as they exist and apply them rightly; and this, and nothing else, he will find to constitute the science of agriculture.

The Secretary read the following letter from Mr. B. V. Iverson, of Columbus, Georgia:

Columbus, Ga., *Feb.* 14, 1855.

Dear Sir—I am very much obliged to you for the present of hybridized corn grains, and have divided them out with a few friends, E. T. Shepherd, Esq., among them. I hope it will succeed as well with us as with Mr. Seymour; 160 bushels shelled corn per acre is hard to match anywhere. I fear we cannot "come it" here, even with this improved variety; but we will see.

I was not a little surprised by the newspaper slip you sent me. Now, if I had been aware of my grass being up before the Farmer's Club, I would have claimed the chance of giving you an article upon its merits which would have done more justice to it. I would like to do this and have it submitted by you at some future meeting of your Club. I must say to you, in all sincerity, that this grass, should it do as well in the north as in the south and southwest, will be found the most valuable discovery of the times. It is emphatically a winter grass, and will stand greater cold than wheat, rye, barley, or oats. When in bloom a freeze has no effect on it, which you know neither wheat nor any of the cereals can stand uninjured. This grass has more sugar or saccharine juice than any other ever found. Stock of every kind, therefore, will give it the preference over any of the grasses, both in its green state and while in hay. This grass will enable stock raisers to send their cattle to market fat, in the early spring, when prices are highest; then yield them abundantly of the best hay from the same crop and from the same field, then sow its seed, without any labor or expense, and then give a large return of vegetable (nature's) manure back to the ground. I enclose you a circular showing its merits. Every statement is strictly true, as I have fully demonstrated by actual experiment, which is worth all the theory, by-the-by. I design introducing my grass in Europe. I am well satisfied that it is the grass for that country, where they have such stock of fine cattle, sheep, &c. Is there any connection between your Institute and any agricultural society over there, either in England, Ireland, Scotland, France, or Spain? If so, please inform me. I would like to send some of the seed there, to have it tested. It is the greatest grass ever

seen for sheep, and will do away with their watery turnips when they get it. It is no trouble to raise this grass for sheep, and once sown will ever more continue, every fall, winter, and spring, to yield its sweet rich, tender, and fattening blades. It bears the trampling of stock without injury. I find my beautiful city well represented in your Farmer's Club—Peabody, Iverson, and Shepherd. Well done, Columbus! This is very gratifying to us, and we prize it highly. Ah, my dear sir, this public testimony and notice by the Club of our efforts to advance the cause of agriculture, is the right way to act. It brings out every good thing from our whole country for the enjoyment of all.

I have some ideas about the grape and its culture, and the apple, but have not room to state them. I will say, that with the stock of the Scuppernong, and stock of the longest lived pear known, we can obtain any where in the Union complete success; the first in choice grapes, by grafting, the last in choice apples by grafting.

Your obedient servant,

B. V. IVERSON.

Mr. R. Paine laid upon the table some figs, two and a half years old, made from tomatoes, the seeds of which resemble those of the foreign fig, and they possessed a sweet and agreeable taste. Mr. Paine said, to make them, he peeled the common yellow tomatoes, put six pounds sugar to sixteen pounds tomatoes, cook together until they begin to be soft; then take them from the syrup and spread them on plates or tins to dry in the sun, frequently sprinkling over them a little of the syrup; press them a little flat before sprinkling; when dry, pack away in stone or glass jars.

Prof. Mapes offered the following resolution, which was adopted:

The Farmers' Club shall henceforth, until the first day of May, meet on Tuesday of each week.

Mr. Bowman described the process used by his wife in preserving peaches, viz: Peel sound, ripe peaches, squeeze them

through a cullender, and when in a proper condition; roll out this pulp like jujube paste. It was always much esteemed.

Mr. Field, of Brooklyn, spoke of the former product of peaches, whence sloop loads used to be exported, and where now they seem not to flourish generally. Also, Virgalieu pears, once abundant and perfect, have since almost entirely fallen off from that fine condition of twenty-five years past. Some now succeed.

Mr. ———, of Long Island.—They succeed now in Kings and Queens counties.

The Secretary read his note on Blood peaches, translated from the French, viz: That this peach possesses the valuable peculiar quality of always re-producing its like from its pits. Some seeds were distributed.

The Club adjourned to Tuesday, the 27th, at noon.

H. MEIGS, *Secretary.*

February 27, 1855.

Present—Messrs. President Pell, Prof. Mapes, Toucey, Avery, Leigh, Reid, Field, of Brooklyn, Bowman, T. B. Stillman, Van Boskerck, Dr. Wellington, Prof. Youmans, B. Pike, Senior, of Jersey, Hon. Robert Swift Livingston, and others. Fifty-six in all.

President R. L. Pell in the chair. Henry Meigs, Secretary.

The Secretary read the following papers, translations, &c., made by him:

[Wilson's Cyclopedia, 1852.]

GEORGICAL EFFECTS OF LIME.

"Lime was well known to the Romans of old, but perhaps not used till the time of Pliny.

Cato directs how a lime kiln should be constructed, and how lime stone should be calcined; and speaks of the contract made between the proprietor of the kiln, and the proprietor of the limestone.

Pliny said lime was good for grape vines and olive trees; and that put about cherry trees, hastens the ripening of the cherries. In some parts of Gaul, (France) lime was applied to grain fields. Marl was freely used by the ancients. They called white marl *leucargillon*, (white clay); this was deemed the best. A second sort of a reddish color, *copriumargon*, this was a stone marl which they broke to pieces on the field, so as to render it difficult to cut the stubble on account of these stone fragments; it was light, more easily carried on the field, spread very thin, and some think it was mixed with salt. The good effect lasted fifty years. A white kind of marl was used in Britain, and lasted eighty years. No man in his lifetime, ever putting it on more than once. A third kind of marl was called *gliscromargon*—a sort of Fuller's earth, lasted thirty years; a thin coat of it, only, was put on the field. Another, called by the Gauls, *eglecopala*, was of a dove color; was quarried like stone; put in the sun and frost, it fell to pieces; it rendered the soil to which they applied it, as fertile as the other applications. These marls, mentioned by Pliny, are well known to-day in Britain and Scotland. The white and red marls are just as he describes them, and act exactly as he said, on the lands.

After the lapse of 1,400 or 1,500 years after Pliny, we, for the first time, hear of lime in agriculture. Bernard Pellissy, in the early part of the 16th century, recommends it to be used in compost on moist lands.

Olivier de Serres, a celebrated agronome (agricultural philosopher) of France, in the reign of Henry IV, about a hundred years after Pelissy, makes the same recommendation as Pelissy did, as to the use of lime in agriculture, and said it was then used in the Belgian provinces of Gueldres and Juliers.

The earliest (modern) use of lime for farms in Britain, is noticed by Dickson, so late as 1788, in such terms as evince a remarkable ignorance of the properties of lime, and great embarrassment or hesitation as to when or how to apply."

We are deeply obliged to the Rev. Dr. Wilson, of Edinburgh, for this useful and agreeable sketch of the lime and marl knowl-

edge of our ancestors. It enables us to make a new comparison between their knowledge and ours.

[Revue Horticole, Paris, 1854. Extracts, translated by H. Meigs.]

SALVIA IANTHINA.

This beautiful sage is much like our *salvia-splendens*. It is called Ianthina, from the greek word Ιανθινος, meaning a violet color. It grows about forty inches high; the flowers and their bracts are all violet color.

This beautiful plant belongs to a group of species, which are peculiar to Mexico and Peru. This Ianthina flowers in autumn; it is easily multiplied from its cuttings. It is well to keep it during winter in conservatory, and set it in a good exposure in May.

AZALEAS OF INDIA.

This family bears the name of *Rose tree*, viz: Rhododendron, greek for Rose tree; and the following varieties are known, viz: Feryassoni refulgens, Rotundifolia (round leaved), Concinna (neat), Mutabilis, Queen Louise, with white flower; Distincta, Tomlinii, Puniceum, Danielsianum, Bowerii, Salopensis, Coronata, Magnifica, Trotteriana, Apollo, Decora, Augusta aurantiaca, Burlingtonii, Rosea elegans, Alstonii, Fulgens, Macranthum, Azalea-macrantha, Chelsonii, Watsonii, Exquisita rosea, Extranei, Cupid, Dilecta, Tenella, Cardinalis, Murrayana, Duke of Devonshire, Frostii, Picturato, Azalea indica lateritia, Variegata, Alba ardens, Alba lutescens suprema, Illustris, Superba, Beauty of Reigate, Obtusum, Amœnum, Squamata, Calabynum, Simsii, Ramentaceum, Championæ, Linearifolium, Calleryi, Mucronatum, Loureiroanum, Reticulatum, Vittatum, Punctata, Dealii, Ageromata, Narcissiflorum, Ledisolium, Scabrum.—63 *varieties*.

NEW USEFUL PLANTS.

A kind of potato is called by the natives Wabesassim. It resembles the common potato; it is mealy, when boiled, and grows only in wet clay ground, about one foot and a half deep. The crane potato is of the same kind, but inferior in quality. The Indians use these for food as well as the Memomim and another long and slender root, called Watappinee. Probably this is the

fruit of those referred to by Nicollet, as the Prairie potato. All the high prairies, he said, abound with the silver leaved *psoralia*, which is the prairie turnip of the Americans, the *pomme des prairies* (prairie apple) of the Canadians, and furnishes an invaluable food to the Indians; there are several species of this genus.

Two new vegetables have been lately introduced into the Jardin des Plantes, at Paris, from the Ecuador, by Mr. Bouvira, formerly Consul General of France, there. One is the red and yellow *oca*, which is of the form of a long potato and has the taste of a chestnut. The other is the Milloco, which has the form and taste of our best potatoes. These two roots, which are found in great abundance in the neighborhood of Quito, grow readily in the poorest land. The oca is cultivated in Mexico, but only succeeds in warm districts.

A root used largely by the Indians, near the mouth of the Columbia, was called (40 years ago) *wapato;* a word reminding us of our word *potato*.

H. MEIGS.

[Paris. Revue Horticole, Dec., 1854.]

EUPATORIUM LEVIGATUM.

This shrub belong to the tribe of the radiated composites. It grows to the height of from thirteen to twenty feet. Branches numerous, long, slender, brittle. The leaves are set opposite to each other—are lance shaped, toothed (*lancéolées, dentées*), swelling surface, and of a dark, dull green color. It is originally from Brazil. A color analogous to the blue of indigo is made from the leaves. It is growing now in the central nursery of Algeria.

By maceration and use of lime a superb blue is obtained from its leaves. The proportion of color obtained dry is *one in five hundred* weight, which is equal, if not superior, to the indigo plants (*les vrais Indigotiers*). It has the advantage over them of longevity. It is true that we have not as yet examined the *Wrightia tinctoria* of the coast of Coromandel, and therefore cannot say. This Eupatorium lives from twelve to fifteen years, and yields several crops of leaves a year. When trimmed like the mulberry it gives out vigorous shoots.

[Annales De La Societe Imperiale D'Horticulture, &c. Paris, Nov., 1854.]

At the session of November 2 Mr. Bouchard placed on the table some pits of the blood peach. He recommends it because it has the peculiar property of always reproducing its fruit precisely.

A NEW KIND OF GRASS.

We have received the following circular:

Columbus, Ga., *Dec.* 13, 1854.

Dear Sir—I take this method to bring to your notice a foreign winter grass, the seed of which is now acclimated, and which I sincerely desire every farmer in the South to possess and cultivate. This grass grows in the fall, winter and spring only; and for the grazing of stock, and making nutritious hay, and restoring worn out fields, has no superior. This grass has the following valuable qualities, which four years' experience has abundantly demonstrated.

1st. It has the largest grain of any known species of grass, being nearly as large as wheat.

2d. It will grew (on very rich ground) from three to four feet high.

3d. It is never injured by cold—no freeze hurts it.

4th. It is never troubled by insects of any kind.

5th. It is never injured or retarded in growing by heavy rains.

6th. It grows as fast as Millet or Lucerne.

7th. It is as nutritious as barley, and stock are as fond of it as they are of that.

8th. It will keep horses, mules, cattle, sheep, goats, hogs, and poultry fat, throughout the winter and spring, from November to June.

9th. It will then (the stock being withdrawn and the ground being rich) yield from four to six tons of excellent hay per acre.

10th. It saves corn and fodder being fed away to stock during the winter and spring.

11th. It completely protects fields from washing rains.

12th. It enables farmers to have an abundance of rich milk, cream and butter, with fat beef, mutton, kid, pork, turkey and chicken for their table.

13th. It will (if followed with our corn field pea) give to farmers the cheapest, the simplest, the surest, and the most paying plan to reclaim worn out fields, and re-fertilize those not yet so, which the ingenuity of man can devise.

14th. It will sow its own seeds after the first time without expense or trouble, thereby reproducing itself through its seeds on the same ground ad infinitum.

15th. It does not spread or take possession of a field so as to be difficult to get rid of, but can be effectually destroyed at any stage before the seed ripen and fall out, by being ploughed up or under.

This grass, having the above enumerated properties, will be found, by all who cultivate it, far superior to any other species ever introduced, or which can be introduced, for the climate and soil of the South. I shall be prepared by July next to furnish seed of this valuable grass to all who desire to cultivate it. My price is $5 per peck, which is as much as is necessary to begin with; it being distinctly understood that in every instance where the party is not satisfied (after giving it a fair trial) the price shall be returned.

Your obedient servant,

B. V. IVERSON.

CONSTITUENTS OF PLANTS.

President Pell said, that the constituents of plants which form organic matter are hydrogen, nitrogen, oxygen and carbon. These four elements are never absent from plants, and by uniting, form the principles of their existence.

Carbon, when it unites with oxygen in equal proportions, forms carbonic oxide and carbonic acid. Charcoal and carbon are the same, and when perfectly pure is known as the diamond. Hydrogen and oxygen uniting form water. Hydrogen in its gaseous

form is exceedingly combustible, and is lighter than any other body known, and is generally found combined with water.

Nitrogen chemically is opposed to combine with any other substance, and when compelled to do so, slight forces readily disunite them. It is, nevertheless, always found in plants, and when they die hastens their decay.

Oxygen is the most important of all elements, constituting the chief part of the atmosphere, and all minerals and earths; it possesses neither smell nor taste, and is soluble to a certain degree in water.

The principal proportion of all vegetable tissues are compounds of oxygen, hydrogen and carbon. Fibre, starch, gum and sugar are compounds of the elements of water and carbon, therefore a fully developed plant requires matters containing carbon and nitrogen to aid their increasing organism, also the elements of water, and finally a soil containing the inorganic substances necessary to vegetable existence. The atmosphere affords great nourishment to plants, its principal constituents are always found in the same proportion. Combined with nitrogen it forms the chief constituents of the atmosphere.

Ammonia exists in the air, but has generally escaped the attention of the chemist on account of the minute quantity, still we know it is there from the fact that rain water always contains it in solution. These are the constituents from which all plants obtain their nourishment. From inorganic matters in the soil, plants prepare that which nourishes them. Virgin soils abound in vegetable substances admirably adapted for the growth of all plants, as they consist in part of organic matters called humus or mould, which is produced by the decay of vegetable matter, and must be the proper food for living vegetables. It is readily dissolved in alkalies, and partially in water. It is extracted in a soluble form by the roots of plants, and in connection with carbon, feeds their tissues; still many chemists declare that humus, as it exists in the soil, is not nourishing to plants. It is so by presenting a continual but slow source of carbonic acid gas. Wood, grain, hay, corn, and many other plants produce carbon. 200 parts of

wood contain 76 parts of carbon; 200 parts of dry hay 88 parts of carbon; 300 parts of dry straw contain 114 parts of carbon. The question would now arise, where did the first vegetables obtain their carbon from, and where humus. Numerous conditions are indispensable for the existence of plants, because each variety requires particular conditions, without which they cannot possibly be brought to maturity. The proper food for the perfection of all the organs of a plant must assuredly contain all its elements. A man, although he can live upon milk from infancy to old age without other nourishment, would die if he were fed on jelly, starch, sugar, or wheat bread constantly, to the total exclusion of other food.

Chemists have been at a loss to know the source from whence oxygen is replaced; when it is extracted in such large quantities, still the quantity is always to be found precisely the same. One hundred parts of atmospheric air have neen found to contain twenty-one parts of oxygen, in every part of the world. Jars buried in Pompeii 1,700 or 1,800 years ago, were discovered to contain the same proportions of oxygen, and yet the consumption is immense. For example, one man respires twenty-five cubic feet of oxygen in every twenty-two hours; one half a ton of charcoal consumes 32,166 cubic feet during its combustion, and every 14,000 of men extract annually by the fuel they make use of, 1,102,000,000 of cubic feet. The consumption by combustion and animals, is very great. A calculation has been made showing that a thousand million of men would render the air totally unfit for respiration in a million years.

Vitality is the power each organ has of always reproducing itself, which it cannot do without a constant supply of the matters containing the constituent elements; and besides these, both plants and animals require inorganic substances, and among them coumon salt, without which I believe men and animals would inevitably die. Plants must be supplied with metallic compounds to do well. In the early period of the early history, plants did not require any nourishment from the earth, being devoid of roots. They consisted of huge palms, ferns, &c., as frequently found in coal formations, and possessed great leaves, which

receive food from the atmosphere in the shape of gases. I have grown plants, and brought them to full fruit-bearing perfection, in fine charcoal dust, exposed to atmospheric influence, and rain water. It yields to plants silicate of potash and other salts, besides condensed gases, such as carbonic acid, &c. This is the most unchangeable of all known substances. I experimented with it many years since, and believe myself to be the first who used it for agricultural purposes. The atmosphere contains the principal food of plants, in the shape of carbonic acid gas. During the growth of plants, they appropriate carbon in the form of carbonic acid; and in the process of decay, emit it in proportion to the quantity of oxygen they contained. Without nitrogen, plants would not grow even in the richest soil, as every part of their structure contains it. The question is then asked, how nature furnishes so large a quantity, and in what form? Nitrogen of the air will not combine with any element except oxygen. It is supposed that there are 1,000,000,000 of persons in the world, and that a whole generation passes away every thirty years. During that period, tens of thousands of millions of animals die. They all contained nitrogen, and during their decay gave it up to the atmosphere, in the shape of ammoniacal gas, this substance will rise from the depth of fifty or sixty feet, and is the most simple of all the compounds of nitrogen. Every shower of rain, meeting with this ammonia in the air, condenses it, and conveys it to the earth's surface, where it renders humus soluble, and fits it for the assimilation of plants. It is as well to state that when ammonia is extracted from rain water or snow, it smells like the perspiration emitted by animals, which gives a hint of its origin.

Therefore it is ammonia which affords nitrogen to the vegetable, and forms the blue and red coloring substances contained in flowers, and by one of its transformations gives nitric acid to the sunflower and tobacco. The solid excrements of animals contain a small percentage of nitrogen, but the liquid a very large quantity. The chief reason why gypsum has such a good effect upon clovers, &c., is that it attracts and fixes the ammoniacal gases floating in the atmosphere, in the soil; 220 lbs. of burned gypsum or chloride of calcium, will fix as much ammonia in the soil

as 13,765 pounds of the urine of horses. Four pounds of gypsum will increase the produce of a meadow at least one hundred pounds when first applied. Gypsum requires much water to decompose it, say two parts to 800 parts of water. One coat of this substance lasts three or four years. Water, ammonia, and carbonic acid, says Liebig, contain the elements necessary for the support of vegetables and animals. The same substances are the ultimate products of the chemical processes of decay and putrefaction. All the innumerable products of vitality resume, after death, the original form from which they sprung; and thus, death the complete dissolution of a generation, becomes the source of life for a new one.

Plants contain alkaline bases, such as lime, magnesia, soda, potash, etc.; if any one of them exists in large quantity, the others are diminished; these bases are connected with the development of plants, as we find when they are deficient, the growth is much impeded, and when absent, it stops altogether. I have, before now, been astonished to find sea plants several hundred miles from the sea, growing in the vicinity of salt works, which plainly shows that our whole earth contains all varieties of seeds, spread by the winds of Heaven, and by birds, which remain in a dormant state, until they find the conditions essential to their growth. It is the same with fish eggs, which are carried by birds, and when deposited in pools where the conditions necessary for their development are found, they hatch and breed. At Nidda, a village in Hesse Darmstadt, multitudes of small fish are found in the salt pans, whereas in the pans at Neuheim, eighteen miles distant, they have never been seen; the reason is that the waters of Neuheim contain carbonic acid and lime.

The amount of food that plants take from the atmosphere in the shape of carbonic acid gas and ammonia, is small; they cannot take more than the air contains. If, therefore, the number of their stems and branches have been increased by the excess of food yielded by the soil at the beginning of their development, they will require more nourishment to form their blossoms and fruit, than the air can furnish them, and will, therefore, not come to maturity; by pruning, when this is the case, we prevent the

development of new branches, and the trees employ the excess of nutriment thus obtained artificially, for the increase of blossoms and fruit. After the first of August, the leaves of trees cease to form wood, and employ the carbonic acid absorbed by them, for the production of nourishing matter for the following year; after this time starch is formed instead of woody fibre, and finds its way to every part of the plant by means of the autumnal sap. Early frosts in the fall, often prevents this provision from being made, when the wood fails to ripen, and the tree is barren, and looks poorly all the ensuing year. From the starch thus prepared, sugar and gum are produced in the following spring. The juice of the maple tree ceases to be sweet from the loss of its sugar, when the blossoms and leaves arrive at maturity.

During the germination of grain, the starch is converted into sugar, by a principle called diastase, which contains nitrogen and furnishes the elements of vegetable albumen. Seed which have germinated, always contain more diastase than is required to convert their starch into sugar, the excess goes to aid in the formation of the first organs of the young plant, and disappears with the sugar. Liebig says, "the development of the stem, leaves, blossoms, and fruit of plants, is dependent on certain conditions," the knowledge of which enables us to exercise some influence on their internal constituents, as well as on their size. It is the duty of the natural philosopher to discover what these conditions are, for the fundamental principles of agriculture must be based on a knowledge of them. There is no profession which can be compared in importance with that of agriculture, for to it belongs the production of food for man and animals; on it depends the welfare and development of the whole human species, the riches of States, and all commerce. There is no profession in which the application of correct principles is productive of more beneficial effects, or is of greater and more decided influence.

And still there is no profession in which men show their ignorance more than in that of agriculture. In every township, throughout nearly all countries, the modes of farming, using manure, and cultivating, are different; and if the agriculturists are asked how manure, when applied to plants, operates, not one

out of a thousand can inform you, as they have never attempted to learn what the component parts of the manure or plants consist of, or the conditions of moisture, warmth or light; and until they do turn their attention to these matters, they cannot be called vegetable physiologists or agriculturists. The same process will not produce straw fit for Leghorn bonnets, and good wheat upon the same plant; in the first instance, there must be little or no nitrogen in the soil, and an abundance of silica; and in the second, a due share of both. We know that animals, fish and birds, may be artificially grown to a large size, and made to produce fat, bone, or great strength, by peculiar food. Jouce, for the sake of experiment, induced an ordinary calf to grow so rapidly, that at the age of two years old, it weighed nearly two thousand pounds. Children fed upon arrow root, may grow fat; but become excessively weak for the want of bone and muscle forming food.

By feeding geese with charcoal dust, mixed with their food, you may induce their livers to enlarge to such an extent as to cause death in a very short time. I have increased the vital activity of plants to such an extent by specific liquid fertilizers, as to induce a squash to reach two hundred and one pounds weight; a melon sixty; a cucumber six feet in length; corn fourteen feet high, and by electricity, a tomato has borne three crops of fruit for me, and ripened them in thirty days; these facts are all notorious, and have been many years in print.

The development of the trunk, foliage, blossoms, and fruit of trees, is dependent on peculiar conditions, which the agriculturist must discover, as the foundation of the laws of agriculture is based entirely on them. If we intend our plants to develope themselves to a maximum size, we must supply them with the necessary conditions.

De Saussure says, a plant which has just broken through the ground, and a leaf just burst open from a bud, furnish ashes by incineration, which contain as much, and generally more of alkaline salts than at any period of their life, showing how early it is necessary to supply our plants with these saline matters.

Bequerel, in his experiments, found that acetic acid formed during germination, is diffused through the moist soil, becomes saturated with lime, magnesia and alkalies, and is again absorbed by the radicle fibres in the form of neutral salts. After the cessation of life, when plants decay, the soil receives again that which had been extracted from it. Struve has proved by his interesting experiments, that water impregnated with carbonic acid gas, decomposes rocks which contain alkalies, and then dissolves a part of the alkaline carbonates. The roots of plants assist in a powerful manner to destroy the coherence of rocks, and disintegration of soil. Though plants require but a very minute portion of alkali, they cannot properly mature without it.

When Virginia was first settled, the colonists found a soil so fertile in alkalies, that it yielded them for one hundred years in succession, wheat, tobacco, and other crops; at the end of which period, they were entirely extracted, and the land has become barren nearly. All long cultivated soils are precisely in this unfortunate condition.

There are lands in the vicinity of Naples which have been cultivated for many thousand years, without manure; the plan adopted has been, to cultivate every three years, and permit the ground to remain fallow in the interim, during which time the atmosphere renders the alkalies in it soluble, and fit food for plants. We all know that wheat should not be cultivated on the same soil twice in succession; it will not grow on a soil that has been permitted to produce wormwood, neither will wormwood grow after wheat, for the reason that they are both great feeders upon alkalies. The ashes of wheat, oats, and barley, are all composed of the same materials; still the land that will grow but one crop of wheat, will mature two crops of barley, and three crops of oats. All grass plants need silicate of potash, which is rendered soluble and fit food for them by water.

Potash is indispensable to the growth of nearly all vegetation, we may replace it in the soil by using magnesia, lime, or soda. Phosphoric acid is found in all plants combined with alkalies, all the cerealia contain large or small quantities of magnesian phos-

phate, which they derive from the soil, and no land can be cultivated unless it forms a constituent, as animals feeding upon grass could not form bone, were it not for the phosphates derived from the grass. Plants likewise extract from the earth, chloride of potassium, nitre, sulphate of potash, and common salt. Centuries ago, fluoride of calcium must have taken the place of phosphate of lime, as the bones discovered in Pompeii contain a large percentage of fluoric acid, while the bony structure of our animals only contain a trace of it.

Wheat, while growing, borrows from the soil large quantities of its component parts, certain portions of which it returns before ripening Many plants are remarkable for the small quantity of phosphates that they imbibe, such for instance as beans, peas, rice, &c.; they contain large quantities of nitrogen; this is probably the reason why they are of small value as articles of food in comparison with other substances. Now that I have mentioned rice, which has been erroneously considered the sole article of food among the Japanese, Chinese and other nations, I will in self-defence make a few remarks concerning it. Rice is not alone in any part of the habitable world the sole support of its inhabitants, from the fact that it is inadequate to support human life. Instinct has taught those nations that they must always use with it oil, grain, meat, fish, or some other diet, to add to it the elements of nutrition that it does not contain. Persons have always supposed that the enormous bulk rice acquires by boiling, indicates a like proportion of nourishment. It is undoubtedly true that rice, by boiling, may be made to furnish a larger bulk than the same quantity of maize, which has probably given rise to the impression that it was more nutritious, but in reality it is very far inferior to Indian meal in nutritious qualities.

Rice contains eighty-six parts in every hundred of pure starch, which absorbs an immense amount of water, and swells into a large firm mass, containing but little nutriment, comparatively speaking. To satisfy yourselves, boil two ounces of common starch in a quart of water; the firm mass of matter derived from it will look like very substantial food, but the bulk thus formed contains but a small share of nutriment. You may take one pound of rice and boil it until soft in water, and it will represent

six pounds in weight; but like starch, it is bulk devoid of equivalent nutriment; therefore, those persons living on it chiefly, will have weak constitutions, and be unable to resist disease, as it is almost devoid of gluten.

Beans and peas, weight for weight, contain from nine to twelve times as much nutriment as potatoes, two or three ounces of beans or peas to one pound of rice, supplies the deficiency, and forms a food that will support man in health. Or if onions are used instead of peas and beans, two ounces may be considered as equivalent to one ounce of meal. Notwithstanding the apparent superiority of beans and peas over potatoes, still chemical research has shown that the potato has a peculiarity which distinguishes it from nearly all other vegetables and cereal grains used by man as food.

Although inferior in nutriment in proportion to the mass consumed, from the fact that three-quarters of it is pure water, still it contains almost all the elements of nutrititon that are discovered separately in nearly all vegetables and grain, therefore, only to be obtained from most other articles of nourishment by mixing different kinds together. Consequently the potato can be used alone for nutrition and support; while in making use of other vegetable productions, there is required a combination of numerous kinds to furnish the various elements that are indispensable for the increase and support of the body of man. When the potato crop failed in Ireland, ignorant people imagined that they could easily substitute some one article of food as an equivalent in itself for the potato; and they signally failed.

Diseases are often dependent on defective nutrition, arising from deficiency of quality or variety of food, rather than deficiency of quantity. The potato, although it does not possess a large portion of nutritious matter, is very remarkable, as containing within itself all the various elements necessary for the formation of healthy blood. When the potato became scarce in Ireland, fevers and epidemics raged. For instance, in the year 1845, potatoes sold for four shillings the one hundred weight, and there was no epidemic. In 1846 the scarcity commenced, owing to the rot, and consequent high price, when fevers began to show them-

selves. Prices still continued to rise in '47, and the increase of fevers was alarming, and during '48 and a part of '49, the prices continued high, and notwithstanding all the benevolent exertions of the British government, aided by the United States, in substituting corn meal, beans, peas, lentils, and rice, for the potato, an epidemic of unparalleled severity continued to ravage the country. In 1850 it was discovered that oatmeal, weight for weight, contained four times as much nutriment as potatoes; and when the people used it and corn meal freely, the disease began to abate. Had it not been for this substitution, the same amount of distress would probably have prevailed for a much longer period, perhaps even until now, as that invaluable root still bears a high price in comparison with former years; and those farmers in Ireland who are successful in its cultivation at the present time, through motives of economy, prefer to sell their potatoes, and live upon Indian and oaten meal.

The matters produced in plants, by the assimilation of their nourishment, may now be considered; starch represents several of them, consisting of water and carbon. Woody fibre protects the cells of plants, and though insoluble in water, animals digest it; when weighed it is found to contain 45 parts of water, and 36 parts of carbon. The chemical composition of common starch is nearly the same; it is more or less soluble in water.

Gum, which is called dextrine, is found in the sap of plants, arabic, or gum arabic, may be dissolved in cold water; but cerasine, or the gum of cherry trees, requires boiling water for its liquefaction; these gums, in their chemical formation, are the same as starch The mucilage, or sticky matter, that water extracts from seeds, is called gum tragacanth, and consists of 57 water and 48 carbon.

Pectine is a substance which contains more oxygen and less hydrogen than starch; it is found in fruits, such as the plum, apple, pear, peach, &c., and in the turnip, parsnip, carrot, and other vegetables.

Sugar contains 66 water and 48 carbon; one variety of it is found in the cane, turnip, beet, carrot, unripe corn, and at the base of clo-

vers, couch grass, and various flowers; when pure it is colorless and devoid of smell. The other variety, known as grape sugar, consists of 48 carbon and 84 water, and is found in grapes, currants, gooseberries, plums and nearly all fruits: it is less soluble than cane sugar, and not so sweet. Cane sugar, cellular fibre, gum, and starch, are identical, consisting of the same elements united in precisely the same proportions.

There is another collection of matters necessary to plants, called the fatty group; these are composed of oils, turpentines, waxes and resins; they are mixtures of three compounds; stearine, oleine, and margarine. If you boil corn, oats, wheat, hay or straw alcohol, wax, oil or resin, is immediately separated.

Wax forms the coat always discovered on flowers, leaves of numerous trees and fruits. It is not soluble in water; and is both tasteless and combustible.

Turpentine and resins are universally found in pine timber; they are soluble in alcohol, and far more combustible than fat.

Then we have gluten, which is the representative of another very important group of substances ,containing nitrogen, as well as carbon, hydrogen and oxygen. Gluten is not soluble in water, but is readily so in vinegar, or caustic potash, Connected with gluten, there is a substance known as glutine, which is a coagulated albumen, insoluble in alcohol.

Albumen is a vegetable matter, resembling much the white of an egg; it is soluble in water, until heated, when it becomes insoluble, take the sap from any plant, and heat it, you will find a coagulated albumine will result, presenting the appearance of white flakes.

Caseine is the solid part of milk when separated from the whey with an acid. It is found in the meal of beans and peas when slightly boiled, and may be obtained from potato or turnip juice by first applying heat and afterwards an acid.

Caseine, gluten, albumen, emulsine, fibrine and legumine, owe their existence to a substance known in chemistry as proteine; and this is composed of hydrogen, oxygen, carbon, 15 per cent of nitrogen, and two per cent of sulphur.

All the above mentioned groups of substances, except the turpentines and resins, must exist in all the plants we cultivate as food for animals.

Professor Mapes illustrated his mode of planting and supporting grape vines on the black board. He has a cheap cast iron holder which is fixed at one end of any line of iron wires, and with a wrench this draws them tight or relaxes them at pleasure.

WASHING TREES.

Professor Mapes—This subject is of the highest importance, and particularly at this time, as many kinds of trees should be cleansed before the commencement of spring growth.

Many methods have been proposed for cleaning the outer surfaces of trees from fungi, &c., and among the earliest methods known was that of various mixtures, of which potash formed the chief part; and, indeed, a solution of pure potash was used by many. Experience, however, proved that this was not a judicious selection of alkalies for such use. Others coated their trees with whitewash, and this, however caustic at the time of its application, would rapidly change to carbonate of lime, leaving the surface of the tree coated with it, and all the pores filled and rendered comparatively inert by its presence.

The scrubbing, rubbing, and scraping of trees in turn, had their day of practice. More recently, however, it has been discovered that a solution of soda in water might be applied to the surface of any tree with advantage; for it will not injure the most delicate bark, while it will decompose all parasitic growths upon the surface as well as dead portions of bark, cocoons of insects, &c., &c.; and the growth of the tree will secure the falling off of these dead portions, leaving a smooth and healthy bark, soft, and capable of readily expanding with the new growth of the tree.

The cherry and other barks which surround the tree in a hoop like manner, will even regain their rotund form after having partly lost it, by the pliant quality given to the bark from the use of soda.

One pound to a gallon of water is found to be of proper strength, and when the orninary sal soda is used, it should be previously heated to redness before throwing it into the water. It may be applied with a mop or brush.

I am sorry to see that the Massachusetts State Society have reported against the use of alkaline washes to trees, simply because some experimenter failed in benefiting his trees by applying a saturated solution of potash, which, in the present state of the art, could readily be conceived to have been inappropriate, and capable of injuring the bark.

When soda is used no such ill effect will ensue. The rains and dews will remove any excess after it has had its first effect on the parasites occupying the surface of the tree, and when this excess reaches the soil it proves a valuable fertilizer for the after use of the tree.

The Secretary reminded the members of the especial pleasure of planting grapes on account of their great longevity. Some having lived and borne grapes for four hundred years, and many for the lifetime of a man.

Professor Mapes—That is true with regard to the Secretary. He is an exception, and outlives all grape vines. He observed that a grape vine in Jersey, which still yields its fruit, was so old that a lady of 80 years of age, when the Professor asked her how old it was, said that when she was a little girl her grandmother said she used to eat the grapes from it when *she* was a little girl. That vine is now about fourteen inches in diameter at about ten feet above the ground.

The Professor remarked upon the high price of roots.

Mr. Bowman attributed it in a measure to the large consumption of them by our numerous immigrants, who used them largely for lack of cheap grain and flour.

Professor Mapes doubted the influence of the experiments on application of galvanic batteries, or other mode of electricity to plants. He thought these no evidence of its reality.

President Pell mentioned the experiments tried by him with marked success on a tomato plant growing in a pot through a hole in a copper top plate connected by wire with a zinc plate at the bottom of the pot. A cypress vine so treated showed clearly the superior growth.

Mr. Meigs said that it was so perfectly easy to try the experiment that Mr. Pell's statement must be sustained until evidence of failure is given by others.

Professor Mapes did not question the superior growth, but he supposed the cover of the pot produced the same effect as a mulch of almost any kind always does.

MUSHROOMS.

Professor Mapes called the attention of the club to the cultivation of mushrooms by Mr. Galbraith.

The mushroom may be successfully cultivated in a dry cellar, provided the temperature range from 50° to 55°, or thereabout. The mode of culture I have practised is simple, and sure to produce abundant supply. Let the groom or coachman collect the horse droppings in the stable, and let them be deposited every morning under a dry shed, open in front facing the sun, to be thoroughly dried. Hang an old fishing net over the pile collected, to keep off chickens or other animals that might break the droppings to pieces, as they should be dried as entire as possible. The material collected in the shed should be turned over every day to prevent fermentation taking place. Construct a frame of boards, say thirty feet by four feet, two feet high at the back and eighteen inches in front, or smaller in the same proportions, if thought best. When there is enough dry material collected to cover the bottom of the frame two or three inches thick, put it in and tramp it all over with your feet to make it solid. Repeat the same process as you collect material, until the bed is complete. Lay four inches of light vegetable mould on the top. In the course of four or five weeks there will appear on the mould something like white threads running all through the mass. When this takes place water the bed moderately, and cover it with dry grass cut from the lawn, as it contains but few seeds to

shake out and grow on the bed; it is better in this respect than common hay. Water cautiously, and in a short time the bed will become an entire mass of spawn, and continue to bear for twelve months, provided the cellar is not too damp or cold. Should the material heat in the process of drying, or afterwards, all will prove abortive.

In a conversation with Mr. Galbraith he informed me that the patent mushroom spawn is made by the process detailed above, and therefore there can be no use of purchasing spawn; and if the droppings used be from horses fed entirely on dry feed, oats and hay, and these droppings be thoroughly dried without decomposition before use, the mushrooms resulting will be of the edible sorts alone. If from non observance in part of the above rules, a false one should occasionally appear, it will be easily recognized.

The droppings in horse tracks often contain spawn, and from the slow accumulation and thorough drying, other than from the more solid or non-volatile portions of the urine of the horse, this spawn is of good quality, and seldom gives birth to spurious kinds of mushrooms.

The plan proposed by Mr. Galbraith may also be pursued in boxes, or on shelves of sufficient depth, but the mass is then rather more sensitive to excess of wet or cold. If the beds are ready by October it will be found to be a favorable season, and in a month or six weeks the mushrooms will be fit for use—by proper care in watering will continue twelve months, when they should be suffered to remain dry for three months, after which, by re-watering, they will again produce vigorously. New beds, however, should be occasionally started, to ensure continuance. When the horses are fed in whole or part on green food, their droppings will not so readily produce mushrooms.

The Club adopted, as subjects for the next meeting, "Manures;" "Recovery of swamp lands;" "Spring culture of root crops," and "The relative value of different kinds of vegetable food for animals."

The Club then adjourned.

H. MEIGS, *Secretary.*

March 6, 1855.

Present—Hon. R. S. Livingston, Dr. Waterbury, Geo. H. Hite, Messrs. Bowman, Cummings, Leigh, Rockwell, Coleman, of Brooklyn, Paul Stillman, Dr. Church, Benjamin Pike, of Jersey, Tousey, Van Buskerck, Dr. Newton, George E. Waring, Prof. Mapes, Mr. Clark, of New Haven, Thomas B. Stillman, and others—in all seventy-seven members.

President Pell in the chair.

Henry Meigs, Secretary.

The Secretary read the following translations, &c., made by him:

DIOSCOREA BATATAS—THE CHINESE YAM.

[Lindley's Vegetable Kingdom.]

According to Brown, this order is separable from the Sarsaparillas by the threefold character of ovary, capsular fruit, and albumen, having a large cavity. Although the genera are few, the species are numerous. An acrid principle exists in the plants of this order, and when concentrated they are dangerous. Tamus communis, for example, has a large fleshy root, so acrid as to have been formerly employed for stimulating plaisters, while the tubers of Dioscorea triphylla aud dæmona have dreadfully nauseous qualities, however carefully cooked. But the principal part of the species of the Dioscorea are the yams—large, fleshy, farinaceous tubers, which form as important a food in the tropics as potatoes do in Europe. The young suckers of Tamus communis, the αμπελος μελαινα of *Dioscorides* and οβρυα of the modern Greeks, and also of Tamus cretica, are eaten in Greece like asparagus.

[Le Bon Jardinier of 1855, Paris.]

We translate from this useful gardener's almanack on the Igname of China (Dioscorea Batatas.)

It seems that after the many fruitless attempts within seven or eight years past, to find a substitute for potatoes, it requires some temerity to recommend a new plant. I do not believe that we have totally lost the potato yet, but that it will be difficult, if not impossible, to find any plant of equal value and quality for

food suited to our habits, soils, climate, &c. However, our farmers will favorably consider the Igname of China (yam), lately introduced into France by Consul Montigny, at Chang-Hai, some four years ago. Mr. Vilmoria has made known his experiments with it, carefully abstaining from high recommendations of it. I approve his caution. But I believe that another year's experience will prove favorable as to its quality, adaptedness to ourclimate, and nutritious character. I have vainly searched for its botanical relationship to the numerous species of the ignames cultivated in different countries. It is, however, certainly different from, although very near, the *Dioscorea Japonica* and *D. Oppositifolia.*

The yam of China is vivacious in its roots, but annual in its stems, &c. Or, to speak more exactly, by its *Rhizomes* (I wish you would say *roots*) gorged with starch, slightly milky. The stalks grow about six or seven feet long, cylindrical in shape, and about as large as a good sized quill, of a violet color, with small whitish spots; when let alone the joints will take root with great facility; leaves shaped much like those of the sweet potatoe; flowers at every joint, and a small fruit follows. The yam is shaped like the sweet potato, only more slender at its joining with its stalk; skin colored like *milk coffee* (*café au lait*). Numerous roots grow out of it; skin very brittle. When cooked (in *ten minutes*) it is tender and mealy like the potato, which takes *twenty minutes* in cooking. Like a good potato it has no marked taste—is very white. One plant does sometimes give several roots, but generally only one. We have had roots of nearly three pounds weight, but generally only four to six ounces each. The roots do some of them attain forty inches in length, but generally twelve or fifteen inches. It is cultivated on a great scale in China, as much so as potatoes are in Europe. The Chinese call them Sain-in. They select the small yams for planting, put them in trenches, cover them with straw, and that with earth. In spring they take them out and lay them in drills, properly prepared. They quickly throw out shoots, which in a month grow six to seven feet long. Then in *drills* prepared in rich, well, deep tilled land, they set cuttings of these stalks or vines, each cutting with its two leaves on, *the leaves being kept out of ground,*

the stalk being slightly covered with earth. In fifteen to twenty days these cuttings have formed tubers and new stalks. It is necessary to lift these stalks occasionelly, to prevent their rooting at the joints. We found in the great Chinese National Encyclopedia, the Pen-Tsao-Kang-Mo, that this yam is called by several names, such as Chou-Yu, Tchou-Yu, Tou-Tschou, Chan-Tchou, Chan-Yo, Chan-Yu, all of which mean mountain yam.

There is no doubt whatever that this yam is so superior as a substitute for the potato, that all lately heralded tubers—Ulluco, Picotiana, Psoralea esculenta, Apios tuberosa, Tropœolum tuberossum, Topinambour and Arracacha.

In this age we are not obliged to struggle forever against prejudice like that against the potato, which lasted almost two hundred years.

NEW USEFUL PLANT.

[From the same.]

Sorgho sucré, Holens saccharatus, Andropozon saccharatus, a Chinese grass, from Consul Montigny at Chang-Hai. As long ago as 1766, Pietro Arduino, at Florence, in Italy, made experiments on this grass to manufature sugar from it. This grass has a slender stalk, growing commonlv from six to ten feet in rich soils, and sometimes more than ten feet high. The stalks are straight, smooth, with leaves recumbent and flexible; it resembles Indian corn, but is a more elegant plant than that. It generally produces at the top a tuft composed of eight or ten stems, which form a conical panicle of flowers, which are green at first, then violet, and at maturity of a dark burple. It is probably an annual, and it is cultivated much as Indian corn is. The pure juice of this grass is almost colorless; when fermented it resembles cider. Its density is 1 050 to 1.075. The proportion of sugar is from ten to sixteen per cent—I mean the two sugars, the crystallizable and non-crystallizable, the latter being about one-third of the whole. It does appear to me likely to compete with beet sugar in the northerly and middle portions of France. In Louisiana, &c, it probably may surpass the sugar cane in yield of sugar. Like the sugar, its green leaves and tops afford abun-

dant forage for stock. Its syrup (vezou) resembles tafia (rum) in taste, &c.

There is no more trouble in its cultivation than in Indian corn and the millets. What we planted at Verrieres was ripe in October. The weight of the standing crop is 77,270 kilogrames per hectare, while that of the beet crop is 49,300 kilogrames.

MANURE AND ITS APPLICATION.

President Pell—Mr. Chairman: The subject for to-day, manure and its application, is the most important connected with our glorious avocation; every constituent of our bodies, and those of our animals is derived immediately from plants; the vital principle cannot generate one distinct element; all inorganic constituents of the organism of men and animals, may be considered as manure.

During the lives of men, animals and plants, the inorganic components which are not required by their systems, are disengaged in the shape of excrements. And after death, in course of putrefaction, their carbon and nitrogen escape into the air in the shape of carbonic acid gas and ammonia, leaving behind phosphate of lime and sundry salts, which are admirable manures, and must be returned to the soil to enable it to maintain its permanent fertility. The animal derives its phosphate from the hay, straw and cereals, that it feeds upon; sixteen pounds of bone, contain the same quantity of phosphate of lime, that two thousand pounds of hay does; and four pounds of bone, as much as two thousand pounds of oats. If we place upon two acres of land, eighty pounds of bone shavings, or dissolved bones, it will supply three crops with sufficient phosphate of lime. I would prepare the bones thus: to fifty pounds of bone dust, add twenty-five pounds of sulphuric acid, diluted with five parts of water; when perfectly dissolved, add one hundred and twenty parts of water, and sprinkle this over the field.

Strange as it may appear, I have found that boiled bones act far more rapidly than unboiled; the reason I suppose to be, the extraction of fat, which probably has a tendency to impede the rapid putrefaction of the gelatinous matter contained in them.

From the factories of glue, thousands of tons of liquid phosphates in muriatic acid are annually thrown away.

A few years since I was witness to this fact, at the large glue establishment of Mr. Hornby, in Hudson street, this city, who informed me that he found it necessary to have carts in readiness to carry the water, while hot, from his boilers immediately to the river; in that state it was sweet, but the moment it became cool and gelatinized, the smell arising from it exceeded anything in nature, and was declared a nuisance by persons residing more than a mile from his establishment, in the direction the wind was blowing. I made an arrangement with Mr. Hornby, whereby he consented to load a large north river sloop for me with this rich oleaginous substance, if I would name a plan whereby it could be saved for agricultural purposes, in a state free from odor. I suggested to him the use of charcoal dust, and at once obtained a barrel from a neighboring charcoal dealer, into which this boiling substance was poured until it began to drop from a gimlet hole bored just above the chime in the bottom of the barrel; the experiment was entirely successful, the charcoal duct absorbed the pungent smell, and the mass was perfectly sweet. The barrel became a heavy lift for two stout men. Mr. Hornby loaded two large sloops for me, entirely at his own expense, except the price of the dust, and I found it a most admirable manure. The free acids contained in it, combined with the alkalies in the earth, particularly with lime, producing a soluble salt, muriate of lime, which had a very favorable action upon the growing plants, as it attracts water from the clouds freely, and in dry land supplies the place of gypsum by decomposing carbonate of ammonia, and forming carbonate of lime, and sal-ammoniac. It restores a necessary constituent to the soil, and gives it the power of retaining the ammonia which falls in rain water and snow. All soils must inevitably become impoverished, unless the substances removed from them by the growth of vegetation are returned, and the time is not far distant, when solutions of glass (silicate of potash) and various other substances will be manufactured expressly for the farmer. The most important and indispensable substance to be supplied to the growing plant, is nitrogen; you may furnish every-

thing else, even in proper proportion, except nitrogen, to growing cereals, and the result will be straw, but no grain—starch but no gluten. Nitrogen enables plants to attract carbon from the air, and fix it in their organism. The fæces of men living in cities where meats are generally eaten, is very rich in nitrogen, much more so than the fæces of persons living in the country upon bread, potatoes, and other like substances. The excrements of human beings is richer in nitrogen than any other manure: 200 parts of the urine of a man in good health, are fully equal to 2,600 parts of fresh horse manure, and to 1,200 parts of cow manure.

Human ordure is considered in China of inestimable value in agriculture. Laws of great severity forbid the waste of any. Tubs are placed in every dwelling, for its collection; and it is invariably used upon plants in a liquid form; the Chinaman always steeps his seed in liquid preparations until germination appears before he sows them. The waste in our cities of these incomparable manures, is immense in the extreme; take New-York for example; the liquid and solid excrements of each person, contains over sixteen pounds of nitrogen, per annum, a sufficient quantity to afford all that is required to raise eight hundred and fifty pounds of wheat; therefore, our 700,000 citizens would raise 595,000,000 of pounds of wheat.

For ordinary crops, sixteen pounds of nitrogen would be sufficient for an acre of land; therefore, 700,000 acres might be supplied annually with that substance by the inhabitants of that city alone. On all our farms, we might mix our night soil with wood ashes, containing a large percentage of caustic lime and muck or animal charcoal, which entirely frees it of smell; although this manure so treated, would be deprived of its ammonia, still its phosphates would be very valuable. Wool, hoofs, hair, horn and bones, contain phosphates and nitrogen, and so do butcher's offal, blood, &c. I have noticed many farmers using large bones for manure, and if they knew that such bones in dry soils would remain unchanged for one thousand years, and that a generation of men pass off every thirty years, I much doubt if they would be guilty of such folly. The fertility of all soils is influenced

more or less by physical properties, such for instance, as attraction for moisture, color, disintegration, porosity and chemical constituents. All soils must contain the earthy phosphates and alkalies necessary to constitute a plant; if these are absent, no growth can possibly take place. An empirical system of farming has applied precisely the same enriching substances to all varieties of plants; this is wrong, for one species of plant will grow luxuriantly in a dry arid soil, destitute of any enriching substance, for instance, the cactus; another requires a great deal of moisture; another still, the potato, for example, finds moisture to a great extent unnecessary at the commencement of its growth, but indispensable after the blossom sets. It will not do then to administer the same manures, and quantity of water to all plants. In fact, without the analysis of plants, and the earth, we shall continue to farm in the dark, which is inexcusable when we have such men among us as James J. Mapes, George E. Waring, jr., H. C. Vail, Thomas Antisell, and others.

Another mode of enriching the ground is, by green manuring, or, in other words, plowing in green crops, while in a growing state, which contains a large percentage of water, say sixty; this hastens decomposition, causes immediate mixture with the soil, and adds nitrogen to the organic substances, contained in it, besides producing sundry chemical combinations, advantageous to the growth of plants. Some farmers permit the green vegetable matters to decay on the surface of the soil; this is wrong, from the fact, that they quickly resolve themselves into carbonic acid gas, and escape into the atmosphere; whereas, if covered, this process proceeds slowly, and the growing plant receives the entire benefit not only of the gaseous matter, but the saline compound also, and the organic and inorganic substances are properly diffused through the earth. The following are the principal advantages to be obtained by green manuring:

1st. Turning under green vegetables, grasses, &c., in the ground on which they have grown, may always be pursued advantageously, where other manures cannot readily be procured; when these become decomposed, the growing crops through the medium of their roots, assimilate them in their growth, and retain them in

their stems and leaves; and if they are again plowed in, they restore the matters which had sunk to a great depth, and cause the ground to become far more fertile than it was before. The manuring is performed with much less loss, than if the herbage had been carried to the barn yard and fermented, or fed to stock; the latter process deprives it of nearly all its valuable properties, which go to form the bone, muscle, and, in fact, the whole animal economy, and the refuse becomes a cold, inert, valueless compound. There is no way in which the crop grown upon a piece of land, can be made to convey more enriching matter, than by plowing in the green leaves and stems, owing to the quantity of water they contain, it is almost equal to liquid manuring, and consequently the benefit is immediate.

2d. It will be found by those who try the experiment, that their succeeding crops will always stand erect, and will produce much more grain than straw, which is not the case when fermented farm yard manure is used.

3d. If the soil is devoid of vegetable matter, green manuring will benefit it particularly, adding not only the substance drawn from the earth, but those extracted from the atmosphere, making it rich in organic matter, and *the farther this process is carried*, the richer the soil becomes, except in saline matters; I would select for this purpose clovers, lucerne, buckwheat, or any other rapid growing plant, producing a considerable quantity of vegetable matter; those being fittest that are best adapted to the climate. The plant that would grow very rapidly with us, might fail altogether in Canada; and the plant that would grow well upon, and enrich a clay or loam, might fail to grow at all upon a sand; the selection made, must suit the soil and location. By green manuring, worthless running sands may be induced to yield fine crops of cereal grains, and the more barren they are, the more they are improved; such soils require a green crop, to be turned under every other year, and alternated with grain. By this process the land will gradually become rich. In Germany, spurry is used for the purpose of green manuring, and owing to its luxuriant growth, it is supposed to improve the ground as much, when eaten off by animals, as when plowed in. In Italy, the white lupin is consi-

dered superior to all other plants, on account of its long roots, which penetrate the soil to the depth of two feet; it is not affected by drought, or molested by insects, and grows with great rapidity, producing luxuriant stems and leaves, yielding in 100 days ten tons of herbage; it opens stiff clays.

I find rye the best green crop to plow under, but rather expensive, still I have turned in many acres of it when five feet high, it is particularly advantageous to sandy soils. I have likewise plowed in turnips, potato tops, red clover after the second cutting, old grass after the first cutting, when about ten inches high. By continuous cropping, the saline substances contained in the soil are brought to the surface, and carried off by rains, as well as by the crops removed, until at length the soil becomes exhausted, and finally returns to a state of nature, unless the agriculturist adopts other means of maintaining its saline productive powers, as no soil can possibly contain an inexhaustible supply of the saline matters required by growing plants. When a crop is to be plowed in for the purpose of enriching the soil, it should be cut, harrowed, or rolled, before the period of full bloom, for the purpose of retaining the nitrogen they then contain, as this element is particularly valuable to the succeeding crop. And I would in no case plow the plants under deeper than four inches, in order that the mass may be reached immediately by air, and at the same time be within reach of the first roots of the succeeding growth of plants, invigorating and nourishing their tender rootlets. It is a difficult matter to induce an agriculturist to plow in a luxuriant crop of vegetable produce, for the anticipated productiveness of his soil, notwithstanding when he has tried the experiment, it has always proved in the highest degree satisfactory; and it cannot be otherwise, from the fact that all green crops contain mucilaginous substances, and woody fibre, which ferment quickly, and readily become fit food for the intended crop. The tendrils and leaves pruned from grape vines should be cut up and buried at their roots, in thirty days not a vestige of them can be found, and the vines will grow more vigorously, and produce finer grapes than by the use of any solid manure.

My opinion is, that manure should never under any circumstances, be placed upon land in any other than a soluble form, or plowed under green; on all farms there should be tanks, or large cisterns arranged, into which all the manure of the farm may be thrown, and there permitted to remain well saturated with water, and when fit for use, pumped by means of a small steam engine, through proper gutta percha pipes, to the field requiring it. Our parks are annually top-dressed with street refuse, consisting of debris, horse manure, and decayed vegetable matters, which for a long time emit exceedingly offensive smells, indicating the escape of gases advantageous to the grass if they were kept near it, but injurious to the health of all citizens exposed to them. If one-third the quantity, instead of being used as a top-dressing, were applied in solution, or suspension in water, to the surface by means of carts, hose, or any other mode, the emanations would be small as compared with the top-dressing, and would last more than a day, whereas the top-dressing would fill the air with miasma for weeks, if not an entire winter, offending the olfactory nerves and injuring the public health, besides almost entirely losing that which constitutes the pabulum of plants; a heavy rain of two or three days continuance, would wash away the productive portions of the manure, or a long frost would destroy its value by locking up the ground, and thus dissipating the ammonia, and a drouth in summer would have a like effect upon spring top-dressing. By keeping such refuse in a liquid form, the loss from emanations is much diminished, the disintegration of the ground necessary to the proper application of the refuse is more complete, and the time required to apply it greatly shortened, and the chance of loss from bad weather diminished.

Our sewer water might be used for the parks in the city to very great advantage, and could be put on by proper carts early in the morning, and the offensiveness of smell would only last in nine times out of ten, according to the atmosphere, during the time of its application. I wish our Mayor, who is immortalizing himself in various ways, would adopt this plan, and he will soon find it copied by every city in the Union. Most soils are admirably adapted to absorb manure rapidly put on in this shape, not merely

mechanically, but chemically, showing that an immediate and highly beneficial combination is formed. The greater proportion of the enriching substances lost by decomposition and rapid evaporation, by the retention of compost in the dry state as top dressing, is preserved by being dissolved and carried in liquid beneath the surface immediately to the roots. I believe that a single ton of solid manure, dissolved with sufficient water, will have six times the fertilizing effect that it would if applied on the surface, as a top dressing, in a solid form.

I know of a gentleman in England who had twenty-eight acres of land in front of his mansion, that at one time yielded hay for two cows only. He placed the manure of forty cows and four horses in a tank, through which he passed a small stream of water, and irrigated with the solution twenty-three acres of the land, and the balance, five acres, he manured with the liquid refuse of his house. The produce of this piece of land now enables him to feed the forty cows and four horses the year round.

There are many arable farms that raise a large quantity of straw and poor grass, that have a small stream of water running through them, which might be made rich and productive, by alllowing stock to convert the straw and hay into solid manure; the stream of water to liquefy it, and gravitation convey the liquid to the roots of plants, without much attention from the farmer. When you have diluted your manure to such an extent that the smell is extinguished, it is in the best possible condition for assimilation by the plant. Liquid manure may be applied twice a week, and pure water once, to great advantage. It is well known to you all, that no root or spongiole can take in manure from the soil in any other shape than that of a liquid, as the most powerful microscopes have invariably failed to observe the apertures to the spongioles of roots; consequently, if there are any particles in your liquid manure visible to the naked eye, you may be assured it is unfit for assimilation by the plant. Place the roots of plants in thin solutions of sugar or starch, and they will thrive; if the solutions are thick they will die.

I have applied liquid manure to grapes with very great advantage, producing a much larger quantity in weight, of a rich color,

and superior flavor, when the next vine but one, ten feet distant, of the same variety, manured with solid compost, bore an inferior quality in every respect. Applied to strawberry plants at the time they were forming their blossom buds, the whole strength of it was appropriated to the production of fruit, instead of leaves; and when the berries came to perfection, the irrigated plants produced magnificent fruit, infinitely superior to those not so treated. The effects of liquid manures are immediate on plants, and admirable upon thoroughly drained land, which I imagined would have precisely the contrary effect, from the fact that they are most thoroughly washed by every heavy rain. Still their fertility increases annually, and when the water passes from the drain it is pure and transparent.

This shows plainly that liquid fertilizers do not escape, but are chemically retained by the soil. I have noticed when the water from top dressed lands falls into the main ditches, it is always turbid with the manure carried with it. Fallow lands, manured in the fall with liquids, will produce an admirable crop of grain, sown in the spring, showing that its effects remain in the soil, undisturbed by fall rains and winter frosts. The lands in the vicinity of Edinburgh, which have been enriched for the last fifty years with sewerage water from that city, are said to yield a number of green fodder crops annually, and the collective weight cut upon a single acre, is reported to have reached eighty tons. With turnips, cabbages, carrots, mangel wurzel and potatoes, with garden productions, such as onions, peas, beans, and with every variety of fruit, quicker and heavier crops have been obtained by applications of liquid manure, than by any other process. In Flanders, the farmers have discovered, by experiment, that a coat of liquid human ordure, has produced fourteen times the quantity of grain sown, where horse manure has only yielded ten; he human excrement employed was, to that of horse manure, as one to five; therefore, one ton of the Flemish, produced a larger yield than five tons of stable manure. In Flanders, the land is plowed and harrowed until it becomes perfectly pulverulent, when the liquid manure is put over.

I infinitely prefer the liquid miscellaneous manure of a farm, for general agricultural operations, to the simple manures; from the fact that by the rules of vegetable physiology, the roots of plants not only seek their food, but when they find it, have the power to select the most suitable to their growth; that is one of the reasons why town sewerages form such an admirable manure for growing crops; it consists of the remains of everything taken into the town, and is, in the greatest degree, miscellaneous. Our American farmers, by mismanagement of their solid manures, such as retaining them on the surface, by the evaporation of their fertilizing properties, and by bad management of them in the ground, lose more than three-quarters of their valuable enriching powers, and the loss of liquid manure is entire. Whenever you see the manure of the stable and cow houses exposed to the weather in heaps, washed by every rain, you may safely conclude that the owner will soon be compelled to turn his attention to some other mode of livelihood.

It has been generally observed that the English, as well as the American farmer, have hitherto imagined that only as good manure, which he could load in his wagon with a four tined fork, but not many years will elapse before he will think a scoop the only farming utensil fit to handle manure; which serves as one and the same time as an enricher of the soil, and for watering.

The following tables show the amount of the elements of plants, contained in the food yearly consumed by two hundred full grown persons.

	88,800 lbs. farinaceous food.	52,000 lbs. of potatoes and vegetables; 4 lbs. p. week, each.	73,000 pints of liquor and other liquids.	11,143 pounds of meat; 2¼ lbs. p. week, each.	8,666 lbs. of bone.	9,200 pounds of cheese; 2 oz. p. day each.	Total.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
Potash and soda.....	736	386	206	72	27	165	1,592
Phosphoric acid,.....	972	26	170	130	2,080	63	3,441
Lime and magnesia,....	354	40	116	11	5,780	9	6,310
Silica,.....	42	6	285	½	¼	.....	1,373¾
Metallic oxides,.....	10	1	½	½	¼	.....	12¼
Nitrogen,.....	2,000	188	488	1,160	155	601	4,589
Sulphur and chlorine, ..	.....	45	10	8	6	109	179

And these tables, the elements of the food of plants removed from two hundred acres, by the common four course system of agriculture.

	50 acres of wheat.	50 acres of barley.	From the land in flesh of animals.	80 lambs of 90 lbs. each.	8 calves.	8 heifers.	4 colts.	Carried away by the 100 acres of grain & 100 acr. of green crops.	Total.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
Potash and soda,.....	940	780	20	16	4	8	1,560	1,654	4,982
Lime and magnesia,..	701	451	289	501	55	91	442	897	3,427
Phosphoric acid, ...	680	841	291	421	43	42	2,098	3,426	7,842
Silica, ...	61	841	.....	.....	....	....	900	332	2,134
Metallic oxides, ...	8	9	.....	.....	....	....	9	7	33
Sulphur and chlorine,	.....	.....	10	25	4	4	42	174	257
Nitrogen, ...	2,720	2,061	227	257	31	47	5,372	4,624	15,339

It is therefore evident, that, if all the excrementitious matter of these two hundred persons were returned to the soil, it would maintain in fertility more than two hundred acres of land, by the aid of the silica contained in the soil, and the ammonia of the atmosphere.

1st. The advantages of manure applied in the liquid, rather than the solid form, consists, first above all, in the prompt manner of its action, its solvent power, and affinity for solid substances. A great number of plants, such as turnips, cabbages, flax, hemp, &c., the growth of which is rapid, require prompt nourishment; they cannot wait for the slow and tedious decomposition of solid manure for the food they require. Liquid manure suits them best, and is extremely beneficial to their advancement.

2d. In the immense saving of loss by the almost instantaneous passage of the enriching matters into the soil, where they at once combine with numerous elements, and enter directly into the composition of plants, undergoing at the same time a certain degree of fermentation, which increases its fertilizing effect without advancing perceptibly the heat in the soil. By such liquid fertilizers nourishment for plants is more equally distributed through the particles of soil, and becomes more rapidly serviceable to the growing crop than by any other plan of cultivation, and a much smaller quantity of manure is required, as has been shown.

3d. In expediting production. When by manuring with solid excrements, a period of three years often elapses before complete decomposition ensues, whereas when liquid manure is applied it comes into full action in less than three months, and the plants derive the entire advantage. And the returns of capital invested in it will be made in less that one third the time, producing a four-fold increase, besides maintaining the fertility of the soil.

4th. Liquid manure is at once available to repair the imperfection of other manures, and acts directly for the relief of suffering plants. In a dry scorching spring it will change yellow leaves into a deep, beautiful green—a metamorphosis not obtainable with any solid manure. We all know that minute seeded plants, such, for instance, as clovers, carrots, turnips, and numerous others, are exceedingly tender during the early stages of their existence, and require to be urged forward into luxurious growth with the least delay possible, and this can only be done with liquid manure.

5th. For clovers and all grasses there is no fertilizer equal to well treated liquid; it is the only manure that does not exhaust the soil; besides, the water with which it is diluted is in itself a capital help for fodder plants; it dissolves, distributes, and, in an inconceivably short time, conveys nourishing matter to growing vegetation. All farmers who have for a long period enriched their fields with solid composts know well what poor result is derived for the expenditure and labor of putting on this substance in dry weather; they further know that two-thirds of it is lost, and if they do not know this fact, I do, from numerous experiments and sad experience.

6th. Much litter is saved by charging water instead of straw with manure. After straw has served as litter, there is added to it silicate of potash and phosphates, which, when the straw is putrefied, are in precisely the same condition in which they were before being assimilated.

Liquid manure properly fermented gains in quantity, and by by its affinity for other substances in quality, and numerous other conditions, there results from that method of preparing manure

six times more than by the ordinary mode. The agriculturist with it is fortified against drouth, and is always prepared to assist his failing crops. It may be given in small or large quantities of a proper quality. It is the only suitable manure for fodder plants, as it never exhausts the soil Stock raisers should take the greatest care of it, and always resort to liquid manure as the basis of good cultivation. Pure water irrigation even is of immense value to drained lands. It deposits valuable earthy matters which cause rapid and luxuriant growth. There are various ways of doing this, to wit: by submersion, filtration, regurgitation, or subterranean irrigation. I have twenty-five acres of muck land so drained and arranged that I can apply irrigation admirably by regurgitation, which consists in closing the mouths of the two main drains. The consequence is that the water swells back and rises to the roots of the crops, or covers them if required. The power derivable from prompt and proper application of plain water to arable land cultivation, is almost unknown to the agriculturists of America. If they would give up the enormous expense incurred by making useless and disfiguring fences, and apply a thousandth part of the money so expended for the purchase of a proper steam engine, for the purposes of threshing pulverizing stones for manure, grinding flour, cutting wood, churning, crushing cobs, and distributing soluble manures and plain water over one hundred acres of land, it would yield them more profit than any farmer in the United States now derives from three hundred badly tilled, wretchedly cultivated, and magnificently fenced acres. The inhabitants of Belgium, Switzerland, and many parts of Germany, are so well convinced of the advantages of liquid manuring, that they convey it to the fields in casks carried on their backs, whence they distribute it by hand. The distribution by this means is at too high a state of concentration owing to the inconvenience of increased bulk and weight by proper dilution. Still they are well paid by the increase of crops for all this excessive labor. Three tons of night soil diluted with eighteen tons of water has produced a more fertilizing effect than a top dressing of fourteen loads of stable manure. With solid manure used as a top dressing, the agriculturist often spreads the larva of destructive insects, or prepares for

their deposit and protection. By the use of liquid manure this mischief is avoided. With regard to the time when liquid manures may be distributed with the most marked effect on vegetation, it may be suggested that the best period is when the roots first begin to spread themselves, and the plant is growing vigorously, and at different stages of their increase, five or six times during the season.

Sprengel says the soil, in reference to vegetation, performs the four following distinct and separate, but each of them important and necessary functions:

1st. It upholds and sustains the plant, affording it a sure and safe anchorage.

2d. It absorbs water, air and heat to promote its growth. These are its mechanical and physical functions.

3d. It contains and supplies to the plant both organic and inorganic food as its wants require; and

4th. It is a workshop in which, by the aid of air and moisture, chemical changes are continually going on; by which changes these several kinds of food are prepared for admission into the living roots.

These are its chemical functions.

All the works of the husbandman are intended to aid the soil in the performance of one or other of these functions. The most important operation that the practical farmer can adopt for improving the soil in my estimation, is liquid manuring. When litter for cattle is chopped up, it mixes very rapidly with excrement, and readily decomposes, particularly when piled up and occasionally irrigated. Two days after the heap is turned it will be found that much fermentation has taken place. And the next thing to be considered is the expense and profit. To obtain a comprehensive idea of which, it will be necessary to examine a few of the methods now practised in great Britain on several large estates. Thirty-eight acres near Edinburgh, Scotland, worthless 25 years ago; total cost of works and apparatus per acre, ninety

dollars, now worth two thousand six hundred dollars per acre. Wiley meadows, Wiltshire, containing one hundred and fifty acres; total cost of works and apparatus per acre, one hundred dollars, yields four heavy crops of grass per annum, and rents for one hundred and twenty-five dollars a year per acre. Duke of Bedford's Tavistock meadows in Devonshire, ninety acres, total cost per acre seventy dollars, land more than quadrupled in value after only five years irrigation. Pusey meadows, Berkshire, one hundred acres, catch meadow, gravitation and open gutters; cost per acre twenty-two dollars, land not previously worth more than ten shillings per acre, is now yielding six heavy crops of grass per annum.

Mr. Harvey's farm, at Glasgow, contains five hundred and eight acres; he employs a steam engine, pumps, under ground iron main pipes, and iron distributing pipes; total cost of works and apparatus per acre, twelve dollars. He has cut ten feet thick of grass from a single acre in six months, the first cut was four feet high; second cut, four feet; third cut, two feet. His farm consists of cold heavy clay land, with a very uneven surface; the highest parts being at an elevation of ninety feet above the point where the liquid manure is collected. He keeps one thousand cows, and retains their fluid for the use of his farm, which diluted with water is found ample. He sells all the solid compost made on his premises, about two thousand tons, to his neighbors, for one dollar and a half per ton, which yields him a clear annual saving of three dollars per acre, over and above the necessary tillage of the farm, and irrespective of the amazing increase in the crops of grass, grain, roots, etc., produced. The fluid is applied immediately after each cutting, and when the cattle are turned upon it seven or eight days afterwards, they eat most greedily, always selecting the spots that have received the largest dose, and leaving entirely any part that may have been missed.

Mr. James Kennedy, Myer Mill farm, Ayrshire, has employed this mode of enriching extensively on four hundred acres of land, drained to the depth of three and four feet; his stock consists of three hundred head of horned cattle, one hundred and fifty pigs, fifteen hundred sheep, and twenty horses. The drainage from

all the farm buildings, from the dwelling house, and the percolations from the manure heaps, are received into large covered tanks; the water used on the premises for diluting is raised seventy feet, and from a distance of four hundred yards. There are four manure tanks of the following dimensions in feet: $48\times14\times12$; $48\times14\times15$; $72\times14\times12$; $72\times17\times12$. There is a steam engine, twelve horse power, which works fifty strokes per minute, consumes fifteen hundred pounds of coal per day, and raises by the pumps attached, eighty gallons of liquid per minute, and discharges forty-eight thousand gallons in ten hours. He uses gutta percha pipes, connected by union joints, which reach three hundred yards every way round the hydrant. The discharge is from a brass hand pipe, the jet reaches the ground in the form of a shower, at a distance of fifty feet from the man in charge of the pipe; with the assistance of a boy to move the flexible hose, he can cover ten acres in an ordinary day's work. He buys his gutta percha pipe by the weight, and when worn out, it will sell for sixteen cents per pound; they generally last with care two years. Canvass hose pipe would be cheaper, and more lasting. The following is the capital account and working expenses for fertilizing this farm:

Tanks complete,	$1,500 00
Steam engine,	750 00
Pumps,	400 00
Iron pipes, laying, and hydrants,	5,000 00
Gutta percha and distributing pipes,	280 00
	$7,930 00
Annual interest on $7,930, at seven per cent.,	$555 10
Annual wages,	520 00
Fuel,	290 00
	$1,365 10

Equal to an annual sum of about $2.30 per acre.

From this land so manured, Mr. Kennedy cuts on an average, 70 tons of grass to the acre, annually, weighed green, and he finds

it necessary to mow five times during the season; he has found by actual measurement, that his rye grass sometimes grows two inches in twenty-four hours. Mr. K. dilutes his liquid manure with four parts of pure water, and lays it on the land six times each year. The fertility of the soil increases rapidly, notwithstanding the frequent cropping; before the liquid manure was applied, it would not keep five sheep to the acre, now it will feed twenty.

Mr. Cuthbert W. Johnson, in his Cottage Gardener, vol. 5, page 39, reports that he laid down a plot of grass in his garden, sixteen yards long and thirteen yards wide, containing two hundred and eight square yards, and that he applied to it in a liquid form, the sewerage of his house several times between March and October, during which period he cut the grass twenty-five times, and secured 1,295 pounds, which is at the rate of thirteen and a quarter tons per acre.

Mr. Robert Neilson, merchant of Liverpool, leases a farm of three hundred and fifty acres belonging to the Earl of Derby, eight miles from that city, one hundred and twenty acres of which he fertilizes with liquid manure, applied by a steam engine, iron pipes, &c. In his report to the agricultural society, he declares that by repeated applications of liquid manure, he accomplished the feat of raising, on a well drained favorable plot of ground, previously in excellent condition and very fertile, one hundred tons of green crop, consisting of Italian rye grass and clover from an acre of land, within a year.

I think earthen pipes may be substituted for iron, successfully; they are incorrosive, and two thirds cheaper; some that I have, which were imported, will not yield to any head of water, less than eight hundred and fifty feet, and three hundred feet is the proof pressure applied to iron pipes.

If pure water is used as a fertilizer, it should be applied according:

1. To the object of the culture: when for leaves more water should be given than when for flowers; less water should be given when for fruits or grains.

2. The depths of the roots: the application should be more frequent to plants, of which the roots are superficial, less frequent to deeper roots.

3. The structure of the foliage: those which evaporate much, such as plants with large leaves, more frequently than perennial, or plants with thick leaves.

4. The consistence of the stalks and of the roots serves to guide the application: roots, with fleshy fibres, do not thrive if too abundantly watered, at the same time they are injured by dryness. Tuberculous, or bulbous plants, or plants with fleshy leaves, can bear a long continued drought, and therefore infrequent, yet abundant waterings, suit them well.

5. In regard to the stage of vegetation: it is important to bear in mind that young germinating plants require light and frequent waterings; those that are in luxuriant growth, abundant waterings; and when the fruit or seed is being matured, the waterings should be frequent. Those that have been transplanted, require abundant watering.

6. The nature of the soil, according to which these rules must be modified: the lighter the soil, the more frequent and plentiful must be the waterings. If it is a compact and clayey soil, less watering will be required; if hardened by drought, water will facilitate the working of the land by plow or spade, and thus enable the farmer to save labor and at the same time kill millions of insect devastators, by mingling cheap poisons with the water.

The state of the atmosphere: It will be readily conceived that the waterings must be more frequent when the temperature is high, the sky clear, and the air dry; so says De Candolle.

The limit of profitable application of pure water or liquid manures, has not yet been reached, though the productiveness of the land where applied, has been increased from a nominal to an indefinite value.

ON THE FOOD OF PLANTS.

Dr. Waterbury—I applied the manure of a season, that made from three cows and a horse, to five-eighths of an acre of "old field," and planted it with corn. The resulting crop was a little over one hundred bushels of ears. The next year I applied the manure of the same animals to twice the quantity of adjoining land of the same quality, and harvested only about seventy-five bushels of ears. There was nothing in the management or in the different character of the seasons to which this difference in the crop could be attributed, and the inference that I drew at the time was, that in the second part of the experiment I had extended my manure over too much ground—that, if my manure had been put the second year on only five-eighths of an acre, that the same labor that was expended on the surplus five-eighths would have tilled and plowed in a green crop on the same ground, and that the whole ten-eighths would have been in better order the next spring for farming purposes. Off of the first five-eighths that was highly manured I took the next season a paying crop of turnips—some six hundred bushels—while the quality of the ten-eighths was not such as to make it advisable to expend the next year the amount of labor on it that is incurred by that crop.

The amount of manure in the country may be considered as nearly a fixed quantity. The variation produced by the importations and by the return from the great cities of the phosphates is scarcely appreciable, and hardly to be taken into account—the drain of inorganic matters that is steadily running downward and outward, from the mountains to the sea. And yet I have taken occasion to show from statistics, on former occasions, that notwithstanding this drain there is no diminution in the productive power of the land in the State of New-York, and to infer that the same is true of the land in the northern and eastern portions of the Union. The agricultural condition of China and some of the older European countries fortifies this inference, while the peculiarities in the habitudes of the surface water of the earth show us *how* it is probably true.

The first Divine injunction that was laid upon man was to be fruitful and multiply and replenish the earth, and he is now fulfilling it. The fact that it is fulfilling proves that men have not existed upon the earth for an indefinite time, and it is interesting to inquire at what limit the fullness of population will be attained, and the commandment fulfilled. There are causes tending to postpone this event. As man improves his condition from that of the savage to that of the shepherd and herdsman, and afterwards to that of the agriculturist, and eventually to that of the civilized man, with towns and a division of labor, he requires less and less land for his support. Yet we must not conclude from this fact that it is the *mission* of man to ascertain the least possible amount of land on which he may subsist, or that he was created to till the soil. It is not for us, in our zeal to avoid the "skinning" farm policy, to adopt any doctrine that to improve the soil is the chief end of man, or that he should be confined to any one portion of the earth's surface. This continent and its brute population have been given us for purposes of subsistence, and even with our diffuse farming we succeed in occupying but a small portion of it.

Another cause that is tending to postpone the event of overpopulation is the continual improvement that Nature is effecting in the condition of the soil. Not only are water and roots bringing to the surface the soluble salts, but there is an annual addition made to the depth of the soil, by the falling leaves and the dead limbs and trunks of trees, that go to make *humus*. Hence Nature's rotation of crops is progressive, from mosses and lichens to the higher orders, such as sorrel or mint—from pine and hemlock timber, with little or no ash in its composition, to beech and maple, rich in the most expensive ash. This change in the case of hemlock timber is continually going on in this country, where land, once cleared of it, "comes in," as the expression is, to a hard wood growth. The natural timber of a region is an indication of the condition of the soil that is well known to the pioneers —one in which they have learned to trust; and the condition of the ground in which the hemlock once flourished and propagated must have been quite inferior to that in which the beech and ma-

ple, *by a more vigorous growth, usurp its ancient place*, The original distribution of our forest trees is worthy of more careful attention than we are bestowing on it, and it is to be hoped that they will receive it before the progress of civilization shall have effaced the limits of their different regions.

As the plants on which man and the domestic animals subsist belong to those varieties that require a rich soil, this progression favors them, and consequently the increase of population, and so we come to have interests vested in these plants as lively as our interests in our own welfare; we come to study their habits and to inquire on what meat they feed.

Premising the germ, the beams of the sun build up the structure of plants out of four classes of substances:

I. *Water.*—This substance is the natural diluent of the juices, and is the medium of all circulation. The material of which every plant is composed must once have been dissolved in water—dissolved in it, too, without any aid from the vital forces of the plant, as simple as sugar is dissolved in water—in this condition must have entered its tissues, and out of this solution must have been revived in the insoluble form by the action of the sun on the leaf. The amount of water that is drawn in twelve hours from the earth by a plant and exhaled into the air in summer is enormous. Hales found that a sunflower that weighed 3 lbs. in that time exhaled 20 ounces on an average. If, then, a crop of hay weigh one ton to the acre dry and ten tons to the acre green, it would exhale nearly six tons of water per day, an amount amply sufficient to furnish it with its saline constituents in any common condition of this water. There is a connection in this way in plants as there is in animals, between the amount of water and the amount of salts they consume. In addition to this mechanical use of water, it must be decomposed, its atoms must be split in some way in the plant, and there is no other source of the hydrogen that is combined with the carbon of the vegetable oils. The economical uses of water, and the way in which it may be made to substitute saline top dressings, were alluded to on a former occasion.

The principal use of the processes of tillage seems to be to produce that spongy character of the soil that enables it to absorb and retain the falling rains. A turnpike road dries up and becomes dusty sooner than the adjoining plowed land, and if a load of loose earth be thrown down on the dry, hard bed of such a road, on removing it after a day or two the ground will be found moist underneath, although there shall have been no rain. The earth is always moist a few inches beneath the surface, and deep culture seems to facilitate the passage of this moisture upwards in the same way that potted plants are watered from the saucer, or that a towel becomes damp when it hangs with the lower part of it in water. The land to which I at first alluded was sadly affected by drought until it was trench plowed a measured foot deep, after which there was no trouble of that sort, and running the plow through the rows of the growing crops in a dry time revived them like a shower.

As to the precipitation of moisture from the air into the interstices of tilled soil, it does undoubtedly amount to something. Yet we must remember that the temperature of the soil is not as low as that of fresh spring or well water, and that it is only on certain days in summer that water vessels sweat. This effect depends on the hygrometrical condition of the air, or the amount of water that happens to be dissolved in it.

II. *Carbonic acid*, which forms naturally about one part in a thousand of the atmosphere, though it is a variable constituent. Though this amount may appear insignificant, yet when we take the whole height of the air into account, and the fact that it extends over the sea as well as the land, we shall find that there is a greater amount of carbon in this reservoir than would suffice to construct another organized system of nature. It is to this substance that plants are, after all, most intimately connected, as it is their principal food. Many varieties thrive when growing in pounded charcoal, without effecting any change in the nature of that substance; and a plant of the "Ficus Australis" flourished and bore fruit in the hot house of the Botanical Garden at Edinburgh, after every root had been successively removed from the

earth. Certain tropical plants send out aerial roots; and yet, such facts as these must not lead us, as it was not long ago supposed they would, to the conclusion that it is the office of roots of plants merely to fix them to the earth, that they only furnish a pediment to the trunk. The fact that a circulation goes on in the stem, is of itself evidence that the root of a plant has a different function from the top It is their office to take into its circulation that carbonic acid that is dissolved in water. As it is the office of gills of fishes to excrete the same gas into water, and it is only when wet that either of them can discharge this duty. Though the absorption of carbonic acid does certainly go on through the leaves, yet it is in solution, and to the roots that this substance is presented in its most concentrated form, and it is only through the root that the processes of agriculture may in any measure increase the supply. There are very few plants, and none of any economical worth, that will grow in a soil of pounded glass, wet with distilled water. When the earth is made two or three feet deep over the roots of shade trees, as it sometimes is in grading our streets, the supply of moisture to their roots is not affected, nor is the supply of salts, and as these trees require little or no nitrogen, it can be only from the deficient supply of carbonic acid, that they die.

But this gas also exerts an ameliorating influence on the soil. Water charged with it acts on granite, feldspar, gneiss, mica, &c., disintegrating them and setting free their saline constituents. In fact, scarcely any mineral substance can resist its long-continued action; so that it is to this substance, as well as to oxygen, that we owe the present alluvion. De la Beche attributes the condition of those stones in the west of England, that have been supposed to be of Druidical origin, to corrosive action of this acid. The chalk formation contains an immense amount of this gas in a fixed condition, as it were to counterbalance the reduced carbon of the coal measures. It is eliminated continually in many regions of the earth's surface, as in the Limagne d'Auvergne, in France, surcharging the soil and stimulating vegetation enormously.*

* The disintegration of granite is a striking feature of large districts of Auvergne, especially in the neighborhood of Clermont. This decay was called by Dolomieu "La Maladie du

Now, if the action of the sun and the chemical condition of the air are unvarying circumstances in the life of a plant—if all our endeavors to increase its growth must be directed to the roots, it becomes of interest to enquire into the services of carbonic acid. These are two, absorption and decay.

1. *Absorption.*—Charcoal absorbs many times its own volume of this gas, and gives it out again to the growing rootlets of plants, and it is to this action, rather than to any salts that it may contain, that its well known stimulating action on growing vegetables is to be attributed. Once in the charred condition, woody matter seems to be permanent in all conditions of air, and moisture. *Humus* or decayed wood, however, exerts nearly the same absorbing power, and by a continuation of the decay also generates the acid gas that it absorbs. But it is to the moisture contained in the soil that absorption from air is principally due.

2. *Decay.*—This is the great source from which carbonic acid, the principal food of plants, is derived, and one of the most important indications in the agricultural treatment of the soil, is to ensure the destruction of the agricultural portion of it. When wood is buried below a few inches, its decay goes on very slowly. Fence posts rot first at the surface of the earth. Those portions that lie a foot or so deep remaining sound.

Woody fibre, buried beyond the action of the air or protected from the air by being completely immersed in water, is preserved by its seclusion. Hence the great fertility of drained marshes, and the increased fertility of underdrained fields, and the policy of subsoiling by which the under stratum is stirred, while the organic substances are not buried beyond the influence of the air. To what extent manure should be covered to ensure the absorption of its gaseous constituents, has always been an open question. Where its fullest effects are desired on the first crop, it should be buried no deeper than just in this way to save it all. The escaping odor tells the necessity of covering ammoniacal manures, and carbonic acid is, I believe, not quite as readily absorbed.

Granite, "and the rock may with propriety be said to have *the rot*, for it crumbles topieces in the hand. The Phenomenon, may, without doubt, be ascribed to the continued disengagement of carbonic acid gas from numerous fissures."—[Lyell's Prin. Geo., vol. 1, p. 317.]

The disintegration of organic substances in the soil, is hastened by the presence of the rootlets of growing plants, which remove by their absorption, the atmosphere of carbonic acid, in which decay immersed them. There is scarcely a trace to be found of the form of a straw or a corn stalk in the manure that has lain for a summer under a growing crop, while the manure that has been summered over in the yard, retains much of its form; even those portions of corn stalk that have been thrown to the surface by the plow, are delayed in their decomposition by this accident. There is nothing gained then in point of time, by allowing manure to lie over a summer to decay, as some farmers do. By such a process, its heating power is also lost. We know the immensely stimulating power that decaying manure possesses in a hot bed over the growth of plants, and it is a principle now well established, that the same aggregate amount of heat is evolved by decomposition; whether that heat is eliminated in a time short enough to make it sensible, or whether the process is delayed as it is through a season under a crop of growing corn. The difference between the manure of a farm in the crude condition, and the manure of the same farm in a well rotted condition, is a crop of corn in favor of the crude materials. In all composting processes there is a waste. We may put enough earth and plaster, and muck, etc., into the heap, to absorb all the evolved gases; but the earth of the field would have done as much, we may even delay the decomposition in the heap, so that the temperature shall not rise appreciably; yet there is so much heat irrecoverably lost. It may be advisable, sometimes, to submit to this waste, to extinguish the seeds of vile weeds, to set some substance like tan into a ferment, that would not have decayed of itself, or to meet an exigency by discounting our next year's manure. But it is a hard shave to pay, one that American farmers cannot live by. There is land enough, and to spare, in this country, that may be made to manure itself; and our policy must enlarge beyond the limits of European ideas to meet this state of things; this ten shillings an acre and dollar a day condition of ours. We often see processes of composting urged upon us, as "Bommer's method" was advocated as ways of making manure, but it is not in the power of man to make one atom of manure; he has never

yet succeeded in combining the elements of our organic molecule. This is the work of God; a constructive work that he effects through the mysterious processes of his power, and it has only been granted to us to hasten or delay for our own purposes, by agricultural practises, the disorganization of this work. All we can do is to save what he gives us, and make the most of it.

In the same way that the rootlets of growing plants remove the atmosphere of carbonic acid with which decaying manures are surrounded, does caustic lime produce the same effect. This action of it is certainly not economical, and its use must depend on some further evidence of its character as a saline ingredient of the soil.

All vegetable substances that are fed to animals, lose something of their worth as manures, by passing through their bodies, lose something more, too, than the difference in weight between the dried food of the animal and its dried excrements, for the waste matter is of a lower grade in organization than the food was. Green crops contain, after all, the greatest possible amount of manure, for they contain all that there is; and aside from the importations of guano, and the natural deposits as of marl, are the sources of all manures. When the salts are in sufficient quantity for common purposes, and yet the ground is deficient in crops, as it is in many of the newer settled portions of the Union, they are the best resource, the expense being nothing, but the interest on the worth of the land and an extra plowing. As green crop, as of buckwheat or of clover, cannot be put through any process of composting or feeding to animals, that will add anything to its aggregate value as a manure; so the great resource of our farmers in conformity with these views, is to the sod. Clover will grow almost anywhere; and a crop of it plowed under will bring, with the help of a little wood ashes, a crop of corn. Even if the clover is cut, the roots and stumps will, if plowed under, leave the ground in better order than they found it. This practice puts a price of $10 and $12 a bushel on red clover seed. Of the manures used in the State of New-York, I am satisfied that more than half is sod, and that no implement can ever supersede the plow in general use, that fails to turn under, this substance.

I know that it would, generally speaking, be easy to bring up the condition of land, if we could afford to raise crops for any other purpose than to live on; and I believe that this may be effected, and yet enough produce may be sold off to make it worth our young men's while to be farmers.

Leaving the water and carbonic acid that are essential to the existence of plants, we come to ammonia and salts, that exist only in certain plants, and these in certain portions of their tissues. These last substances vary in amount in different species, and may vary in amount in different individual plants of the same variety. Wheat growing on unmanured ground, contained for for every 66 of starch, 9½ of gluten, while that growing on ground manured with blood and urine, contained to every 45 parts of starch, 35 parts of gluten. The mineral constituents of plants, though they do not vary to so great an extent, are still far from fixed in their nature, and we have very good reason to believe, that some of them in certain cases, take the place of others—that potash sometimes does duty in place of lime or soda. The doctrine that plants are definite chemical compounds, constructed on their mineral bases, cannot be for a moment maintained, and we are not authorised, as yet, to draw any conclusions as to the necessity of such inorganic ingredients from any premises other than the most extended observations.

III. *Ammonia.*—This is another gas somewhat similar to carbonic acid, and like it, soluble in water; but unlike it, alkaline in its properties. The solution of the one, as it exists in the soil, is neutralized by that of the other forming a solution of the carbonate of ammonia. As we have seen that carbon can only enter into the circulation of plants in the form of carbonic acid, so nitrogen only enters into their juices when in combination with hydrogen, forming this gas; and all the nitrogenized products of vegetation, are indebted to the ammonia in the soil for their origin. Again, as we have seen that carbonic acid exists originally in a certain fixed condition in limestone and chalk, so ammonia to a certain extent, exists in the natural deposits of sal ammonia and sulphate of ammonia in volcanic regions. And further, as we have seen that the only available resource of agriculturists for

supply, was in the case of carbonic acid to the decay of manures in the soil, so to this process of disintegration do we owe all our available stock of ammonia. Liebig has demonstrated the presence of this, the volatile alkali, in rain water; but this source of it is probably connected with the emanating of it from the bodies of animals and their excrements. It is absorbed to even a greater extent than carbonic acid by the earthy and organic constitutents of the soil. In this way the copious supplies of it, given off by the rapid decomposition of those substances containing it, are reserved and gradually given out to the rootlets of plants. Charcoal absorbs ninety times its own bulk of this gas, and humus has almost an equal power; burnt clay takes it up freely. The practical application of earth as a deodorizer in burying the carcasses of animals, depends on its absorbent power. A few inches of earth is sufficient to destroy all smell. Four pounds of gypsum can absorb enough of this gas to supply one cwt. of grass with it, and it was for a long time supposed that it was in this way alone that that substance stimulated meadows.

Of the ultimate sources of ammonia little is known. It was at one time supposed that it was derived directly from the nitrogen of the atmosphere, but that idea is now generally given up. By what forces the nitrogen and hydrogen atoms are united, we cannot tell; but we know that if the resultant compound gas (ammonia) be poured through a red hot tube, these elements are separated. We may, if we please, infer from this, that the atom is of organic origin. Yet it forms no part of the constituents of healthy animals, being generated by a fermentation, and it exists as ammonia in few if any plants, being used in them towards forming their azotized parts. We have yet to trace this atom through its various states and conditions, through its various forms and combinations in animals and plants. We have yet to ascertain whence it comes, and whither it goes. Does it remain with us year after year in some form or other, and will the importations of guano in this way prove of permanent benefit to the country, or does it return directly to the passive condition of the atoms of the inorganic world.

IV. *The Salts.*—From the small quantity in which these exist in the tissues of plants, I hardly know whether to class them as food or as medicine; yet in these days, when the limit between the two classes is becoming daily more indistinct, we may rank them as food. We are apt to associate their existence in the wood of the plant, with the condition in which they exist after complete combustion as ashes. Prof. Rose, of Berlin, has shown that there is but little analogy, that ashes are the result of the complete oxydation of the inorganic portions of the plant, while the heat of combustion, if the supply of oxygen is limited, sublimes and dissipates these elements with its smoke. It is well known that close stoves make less ashes from the same wood than open ones, and that little or no ashes is produced by the combustion of charcoal. On the one extreme then, there are no ashes in wood, as every wood-chopper knows, while at the other extreme, ashes may be melted into glass, as every body has heard. It does not follow then, that when we have furnished the earth with the ashes that we have obtained by burning one tree, that we have furnished the mineral matters necessary for the growth of such another. It does not follow any more certainly, than if we had furnished an equal weight of pounded glass, and the claims of all the mineral manures must be referred back after all to the tedious details of extended observations. Prof. Rose has shown that these inorganic substances undergo processes of reduction in the plant, and of oxydation in the animal, as food does, and that they are generally most soluble in the oxidized condition; yet the refuse of the leaches of asheries lies exposed to the weather for years undissolved, and ashes applied to the soil must to a great extent do the same thing. Yet they do slowly dissolve, for they are well known to be a very permanent and lasting manure.

When we consider the small percentage of mineral matter that go into the composition of a plant, we must not conclude as some have done, that it is only necessary to furnish these to a barren soil to furnish two pounds of the ashes of wheat, in order to obtain one hundred pounds of grain. Indeed, if the ashes were perfectly soluble, and if every element of organic food were present, this result would not occur. Experience has shown that the aggregate amount of salts in the soil, must be many times greater than

any one crop can use in a season, to ensure a good growth, and that no one plant during its life time, can succeed in effecting any great change in the saline constituents of the ground around it. When the soil has been deteri rated in this country in any marked way, it has taken a succession of crops to effect it, and then this result has been gradually induced. There has also been generally, a downward rotation—a rotation from those richer in ash to those poorer. Thus we see that the soluble saline constituents of the soil, seem to be governed by the same general laws that govern saline impregnation under common circumstances, or as soon as these matters were exhausted from the soil, an abrupt period would be put to the growth of the plant. The existence of a scanty growth of pine, and other woods deficient in ash, on such exhausted soils, is an illustration.

One hundred pounds of the ashes of the beech contain enough of inorganic elements for 15,000 lbs. of wheat. Now, though most soils are benefited by the application of ashes, yet in no particular instance have any such more than a hundred fold results been verified; nor, indeed, are they claimed, I believe, even for any of the soluble salts. Though ashes, leached and unleached, had been applied to the fields to which I have alluded in a bountiful way the previous year, while they were planted with potatoes, yet there was a great variation in the amount of the corn crop on the two, and that variation was most consonant with the amount of the manure applied. When this land was put to corn without stable manure there was no crop of any account.

From the soil of Virginia has been removed, by the successive crops of tobacco, 1200 lbs. of the alkalies per acre—(I quote from the Treatise of the London Society for the Promotion of Popular Instruction)—and with this gradual drain has been a gradual exhaustion. As far as the saline constituents are concerned in the fertility of soil, the difference, then, between a fertile and a barren soil must be comprised within this limit of 1200 lbs. to the acre. If we suppose that a cubic foot of water weighed 60 lbs., and if we assume that a cubic foot of soil weighs 100 lbs., we may readily calculate the weight of an acre of land

to the depth of a foot. On establishing the ratio between the 1200 lbs. and the weight of the acre of ground, we shall find that it amounts to ·00027+, a quantity within whose limits must be contained the difference on analysis between the soil of early Virginia, a soil marvellously fruitful, and the same fields now given up to the feeding of sheep. How delicate must be the tests, how sensitive the balances that can appreciate the different items that go to make up such a sum. But here the question arises, Is there any way in which such a soil may be restored? At what cost can these 1200 lbs. of the alkalies be supplied? If we suppose that the mixture of potash and soda, of which they consist, could be purchased at 3 cents per lb., it would amount to $36 per acre to be added to the present worth. It follows, then, that if a restitution of the saline constituents of such a soil would restore it, it might be done at such expense as would purchase 28 or more times as much new Western land at government price. And, sir, in these days of steam communication, when men measure distance by hours instead of miles. Such considerations as these are coming to have more and more weight. Long Island was once the garden of New-York, but the enterprise of a gentleman present has demonstrated that New Jersey, by scientific management, may compete with it, and they must both of them yet compete with the prairies.

I said, sir, if a restitution of the saline constituents to such a soil would restore it, it is certain that their presence alone would not restore it. Experience has shown, in those portions of the State where wood exclusively is consumed for fuel, and where asheries have made large supplies of leached ashes, that those materials are very valuable, yet that the most copious dressings of them cannot fully and immediately restore land—cannot supply the want of carbonic acid and ammonia in the soil. Berzelius found urine to contain only one per cent of salts, and Dr. Jackson, of Rhode Island, in an analysis quoted by Dr. Gregory, in his edition of Liebig's chemistry, found fresh horse manure to contain not quite as much soluble salts. We cannot believe that a pound of any agricultural salts can be worth a hundred weight of either of these substances, or that a farmer, who has to burn them and carry out their ashes to his fields annually, would be a

gainer by the proceeding, nor, indeed, that any agricultural policy that in any way approximates to such practice can be correct. It was a pagan practice to burn the dead, and it was in burying their dead that the early Christians most ostensibly differed from the worshippers of idols. As the doctrine of a final resurrection of the body led them to this change of practice, so the doctrine of a resuscitation of organic atoms leads us to bury the evanescent forms of vegetables in the bosom of the earth, and patiently to await their reappearance in the coming harvest.

B. V. Iverson, of Columbia, Georgia, to Henry Meigs, *Secretary of the Farmers' Club:*

February, 1855.

I send you a plan for a fence with the seeds of the Mimosa, a tree I have. This is a rapid grower; straight when staked; lives, I was about saying, always; does not put up from the roots; has no scions or shoots. In six years will do to nail the plank on; can be topped, and never grow higher than six or eight feet; can be trimmed easily to have a small head; producing little or no shade. These trees will grow any where, stand any cold and wind. Stock wont bark them. In fine, where rail timber is scarce these trees would be most valuable. They bear for six weeks a pink flower, beautiful and fragrant. The tree is propagated from its seeds. Below is a rough idea of this fence.

B. V. I.

The idea is, the tree is the post trained first straight, and set out 10 feet apart, and plank nailed on like a paling. When the plank rot put on new ones. Outside and cross fences can be made in the above way.

NEW USEFUL PLANTS.

[Le Bon Jardinier for 1855. Paris. Extracts translated by H. Meigs]

Sorgho Sucré—Holous-Saccharatus—Andropagon-Saccharatus—or, in plain English, a new grass from China, introduced by M. Montigny, the consul of France, at Chang-Hai. This grass is

slender, grows commonly in good soil, &c., from six feet to ten feet high. The stalks are smooth, straight, and the leaves falling backwards and flexible; somewhat resembles maize, Indian corn, but is a more elegant plant; generally bears a tuft composed of eight or ten stems, composing a panicle of a conical shape, covered with flowers, which are green at first, then gradually violet, and finally dark purple when at maturity. This grass is probably an annual, and its cultivation much like that of Indian corn. It contains sugar of some importance probably. Alcohol and a fermented liquor like cider are made from this grass. The juice from it is almost colorless. The proportion of sugar in it is from ten to sixteen per cent. I mean by this the crystalizable and uncrystalizable both. The former being about one-third of the whole. This leaves from three to five per cent of crystal sugar. This grass grows well wherever beets do, and in warmer climates where beets do not flourish. Its green stalks and leaves give a fine rich forage. My crop of it at Verrieres was ripe in October. Soil light suits it best.

[American Journal of Science and Arts, March 6, 1855.]

NUMBER OF EGGS OF FISHES.

Curiosity is always excited by the view of the countless number of eggs in fishes. This journal contains the following reliable egg statistics, viz.: The thick lipped grey mullet has the greatest number yet known,..... 13,000,000
Codfish,..... 11,000,000
Turbot,..... 9,000,000
Plaice,..... 6,000,000
Carp; whose eggs are largest,..... 700,000
Large perch,..... 71,000

COLZA.

A. Ludlow Case, Esq., of the U. S. navy, sends to the Club for distribution, five cans of colza seeds from the U. S. Light House Department. It is anticipated by our government that oils for lights will rapidly become scarce, unless attention be extensively paid to the production. Europe has found colza oil important. The United States have little experience in it. The seeds will be carefully distributed among our farmers.

Mr. Waring presented a good specimen of Egyptian corn, or millet.

Subjects for next meeting—"Improvement of Swamp Lands," and "Cutting and Spring Treatment of Asparagus."

The Club then adjourned to Tuesday, March 13, at noon.

H. MEIGS, *Secretary.*

March 13, 1855.

Present—Messrs. President Pell, Hon. Robert Swift Livingston, Geo. B. Rapelye, Prof. Mapes, Prof. Waring, Dr. Church, Dr Woodbury, Mr. Sheldon, Rev. Mr. Carter of Brooklyn, Dr. Shelton of Jamaica, L. Island, Paul Stillman, Messrs. Leigh, Hopkins, Phenix, Pike of Jersey, Lodge of Jersey, Toucey, Robinson and others—65 members.

Hon. R. S. Livingston in the chair.

Henry Meigs, Secretary.

The Secretary read the following translations, &c., made by him, viz:

[Bulletin De La Société D'Encouragement. 1853. From Alexander Vattemare.]

Doctor Robonam states his experiments on the malady of the grape from 1849. All the leaves and grapes on new and old vines which run on the ground are sound and healthy; those which run over fresh tilled land are less so than those which run over green sod; those that run over heaps of stones are healthy.

Messrs. Jametel and Vincent mention a singular fact. They saw in the forest of Fontainbleau a sandstone rock covered with large whitish spots, some more than a meter large. They sought for the cause of this peculiarity, and found that leaden bullets had been fired against this rock, and that there was a slight amount of lead at the tops of these spots where the bullets struck, and the whitish color was owing to a partial solution of the lead. They then recollected that in 1839 an encampment of soldiery

was there, who practised firing at a mark on this rock. This natural solution of the particles of lead left by the bullets has eradicated all the moss, cryptogams, lichens and lycopodes (club mosses), and no plant whatever had touched the spots whitened by the lead for fourteen years past.

[Annales De La Société Imperials D'Horticulture. Paris. Dec., 1854.]

Report of Dr. De Bouis on the published works of the Smithsonian Institute.

The generous and enlightened Republic of the United States has done this society the honor of comprising it in the number of those useful institutions to which it sends its volumes of memoirs.

You have referred to me the examination of the four magnificent volumes folio, published by them, 1851 to 1853, received through the medium of Mons. Vattemare.

I have examined them at full length, and find their high importance. We must return our thanks to the Institute. Hereafter we will make a full report.—*Extracts translated by H. Meigs.*

PREMIUMS GIVEN FOR INCOMBUSTIBLE BUILDINGS.

The ordinary cheapness of incombustible materials for building when compared with our wooden structures, the greater ease in building with them, together with the imperial power of habit which has always hitherto rendered the use of combustible materials more general than the incombustible. The latter have doubtless been properly understood and valued by some men, especially in periods of high progress and knowledge. Of late years many attempts have been made to render wood incombustible without destroying its strength. Public buildings, factories, &c., should be incombustible, and private also; insurance is no remedy for such losses; the loss is that of the whole community, and in thousands of cases irreparable, by the burning of things which cannot be replaced.

Although incombustible buildings may cost something more, yet considering the tax of insurance being removed, and considering the duration of this new incombustible house, both landlord

and tenant will in a few years be great gainers by the change. The Société d'Encouragement has already interfered beneficially in this cause, and offers the following *premium*: 2,000 francs ($400) for an essay on the various building materials, incombustible naturally or artificially; their ordinary dimensions, method of building with them, their cost, &c.; to include strength, convenience, economy, and all necessary information, drawings, &c. A premium of 3,000 francs ($600) for new processes, new materials or methods of building of incombustible houses.

[Le Bon Jardinier, for 1855. Paris.]

COLZA.

Chou-Colza (Cabbage Colza,) Brassica oleracea campestris, a crucifer, although planted chiefly for oil, is good also as forage. When that is the object, it is sown broadcast upon the turned stubble of wheat, immediately after harvest, from eight to ten pounds of seed on the hectare of about two and one-half acres; cover in with the harrow. Ordinarily it stands the winter following unhurt, and furnishes next spring good pasture for sheep, and cut up is good for the stable.

CAMELINA SATIVA OF THE BRASSICAS.

Lindley, in his *Vegetable Kingdom*, says it is called Gold-of-Pleasure. Brooms are made of its dry haulms; its cake rather too acrid for cattle.

It is recommended in the Patent Office Report of 1851 for oil purposes. Some suppose it indigenous, but as it has been found only where there has been cultivation, it is now presumed to have been imported, not native in America. In some parts of the world it is cultivated for its stems, which yield a fibre for spinning, and also for its oleiferous seeds. Merat and De Lans say so for Flanders.

These seeds are sometimes called Sesamum seeds. But they are not. William F. Taylor, F. L. S., has lately drawn attention to it for oil and for feeding cattle, and for other purposes. Light soils suit it best, but a crop of it never fails on lands of the most inferior description—on barren, sandy land where no other vege-

table would grow. The best time for sowing the seed is from the middle of March, or (as early as possible,) to later periods; and for autumn, sow in August. Fourteen pounds of seeds are enough to sow one acre, either drilled or broadcast, but drill is best, twelve inches apart. Must be carefully weeded. If sown very early, two crops can be raised in the year. The leaves of it are very small, and do not at all injure clover growing under them. No insect touches it, not even the aphis—the cabbage louse. The seeds are known to be ripe when the pods assume a gold color. Care is necessary in gathering as soon as ripe, or the seed is spilled. A good season gives about thirty-two bushels of seeds per acre, from which 540 pounds of oil can be obtained—more than can be got from flax seed. (Differing from Lindley as to the cake.) The seed is extremely nutritious, and has no superior for feeding cattle. The oil is yellow and smells like linseed oil.

AMERICAN INSTITUTE LIBRARY, MARCH, 1855.

Just received from Alexandre Vattemare, in addition to numerous recent donations of books, the quarto volumes to 1853, of the great French work "Bulletin de la Société d'Encouragement, pour l'Industry Nationale."

The objects of this interesting society are analogous to those of the American Institute, and those who are seekers after knowledge should have it by them for reference. It is now in its 54th year. It was recognized by the French government, in 1824, as of high public utility. The volume for 1853 says Paris is the most industrious and productive city of the whole continent; that it has 325 classes of industry, in which there are employed 64,816 masters and foremen, 342,530 workers, of all ages and sexes; making the working hands of Paris 407,346.

This society publishes every new discovery or improvement in every art and business of home or abroad, and illustrates them with very faithful engravings.

The chairman announced the subjects for discussion, "Improvement of swamp lands," and "how to cut asparagus."

The first question was proposed by Mr. Field, of Brooklyn, who not being present, Mr. Pell stated that he would make a few remarks on

DRAINAGE.

The first thing to be considered by the agriculturist on a farm is, whether it requires draining, and there are but few farms that do not, although until very recently it was only considered as the means of relieving land from springs, and consequently applied to excessively wet ground, chiefly producing aquatic plants. Moisture has great influence on local climate, even on lands apparently dry. Fogs frequently arise which serve as a conveyance for decomposed matter into the air, rendering it impure, besides producing chills and otherwise injuring health. Wherever surplus moisture accumulates, holding animal or vegetable substances in solution, you will find fever and ague prevails.

In traveling through a country undrained, you will observe that the air is cold and chilly, which changes to a mild and genial temperature the moment you come upon a drained district. The reason is, that every inch in depth of water taken off by the drains, which would otherwise evaporate, saves as much heat on each acre as would raise ten thousand million cubic feet of air at least one degree in temperature. Evaporation is greater in summer than at any other season of the year, and there is a difference of seven degrees in the summer temperature between drained and undrained land; consequently, we can to a certain extent produce a genial climate by draining. The following are the principal advantages, agriculturally speaking, to the farmer, by the drainage of his land.

1st. He removes excess of moisture, which prevents the air from penetrating the soil, and assimilating nourishing matter for the plants.

2d. He facilitates the absorption of enriching substances by the earth, and consequently diminishes its waste, by surface evaporation, and being carried off by heavy rain storms.

3d. He prevents the sudden fall of temperature and consequent chilling of the growing plant, decreasing the effect of the sun's heat not on the surface only, but at the roots.

4th. He removes obstructions to plowing, and poaching by the feet of his teams.

5th. He prevents foot rot in his sheep, foot ail in his cows, chills, colds and bad health to his stock, generally.

And if his land is drained properly and thoroughly, every drop of rain will sink on the exact spot where it happens to fall, and pass through both surface and subsoil, until it finds the drain; such drains effect the following results:

1st. All the water is filtered before it enters the drain.

2d. There cannot possibly be any loss of that fine portion of the soil, which contains its most valuable properties.

3d. After many years the subsoil changes to the nature of soil, to the depth of the water in the drains.

4th. It produces a proper decomposition of the organic and inorganic constituents of the soil.

5th. The deleterious ingredients in the soil are rendered soluble and carried off in the drain.

6th. The texture is loosened, so that the roots penetrate into the subsoil, where they rot and form food for other plants.

7th. The subsoil changes and becomes fit to mix advantageously with the surface soil, supplying the principle that may have become extinct by continual cropping; and, if the subsoil should happen to be clay, and the surface sand, or vice versa, the benefit accruing would be great.

8th. The enhanced fertility of well drained land is due to the increased depth of feeding surface for the roots of plants. It will endure wet and drought far better than undrained land; during long and protracted droughts my thorough drained fields call attention by their beautiful verdure, the soil of such a field never bakes. It is easily tilled, and always in condition for agricultural

operations, which, in a changeable climate, is a great advantage, as the cultivator seldom misses the time to sow, and manures always produce the desired effect.

The admission of air to the soil through the drains below, is a great advantage; flower pots would be much improved if there were five holes in the bottoms of them, instead of one. The object of draining is not entirely to deprive the soil of moisture, but to equalise the quantity, so that the highest degree of fertility may be produced. In orcharding, if the annual increase in the growth of trees on undrained land, is four per cent., the increase on drained land will be eight per cent; and on drained and irrigated land, sixteen per cent. Fruit trees, which had always proved barren, have been thrown into full bearing by thorough drainage; and wood lands, growing oak trees, supposed to be two hundred years old, have been much benefited by draining; gardens that produced spare crops, have been made fit for the introduction of a succession of crops during the same season, enabling the cultivator to apply liquid manures and irrigation successfully. The wetter your land is, the greater, of course, will be the evaporation; and consequently, the greater its excess of coldness. This may be illustrated by the method used to cool wine in summer, by wrapping a piece of wet flannel around the decanter, and placing it in the sun; as the moisture evaporates from the flannel, the temperature of the wine falls almost to the freezing point; you may wrap a vessel of water in flannel, wet with brine, and place it before a hot fire, it will soon produce ice. Wet land is warmer in the shade than in the sun. Soil does not act chemically in the process of the germination of seeds; its only action is to afford the means of supplying moisture, air, and warmth continuously after germination. I have examined several soils under a strong microscope, and found them to consist wholly of particles of various shapes and sizes, consequently, they never can come so close together but that there will exist passages between them, making the soil more or less porous. I found, even, impalpable powdered soil, when placed under the microscope, presented the same wonderful variety of shape. In all soils there are two classes of pores: first, those which exist between the particles of

land; and second, the minute pores which are found in the particles themselves. When the soil is perfectly dry, these large pores are filled with air, and no moisture exists in them. A seed placed in this soil will not vegetate. When the large pores are filled with water, and the small ones with air, the seed will germinate at once. Land is always in proper condition for the growth of seeds, when it has the appearance of being well watered, but will still crumble when pressed between the hands without adhering to them. The first effect of an excess of water in the soil is a diminution of the amount of air beneath the surface, which air is indispensible in the nutrition of plants, and if altogether excluded, the seed would decay, or remain in a dormant state. After your soil is most thoroughly drained, it must be as completely pulverised by plowing, harrowing or spading. Old Jethro Tull was so impressed with the importance of pulverising, that he made himself believe that nothing else was necessary, not even manure. The calculation is that a drained field of one acre pulverised to the depth of eight inches, will retain beneath its surface, 12,545,280 cubic inches of air; by plowing nine inches, your soil will retain beneath the surface, 1,568,160 additional cubic inches of air. During many years, fevers and ague have been prevalent in certain localities, and if examined into, it will be found that they all require draining, and it is necessary that the drains should be covered, if it is desirable to render the neighborhood healthy; a covered drain, the same depth as an open ditch, will drain a much greater breadth of land, than the ditch will. The sides of all open ditches soon become covered with vegetation, and the stagnant water contained in them will render a whole district unhealthy.

Pit draining I have often found effectual, when the ordinary drain failed; first find either by boring or digging where the bed of water is concealed; there sink a pit until it reaches it, which will be known by a sudden rise of water; fill this pit with large round stones, leaving numerous interstices, and from this construct a drain to the nearest ditch. If you happen to hit upon the proper location for the pit, the result will be found most satisfactory, and will rid you of an immense quantity of troublesome water.

If stones are difficult to be obtained, wood will be found an excellent substitute, will last for many years, and when it finally decays leaves numerous cavities which the water, by eternal filtering, causes to remain open. I have made a few such thus, by way of experiment; dug the drain five feet deep, and at the bottom placed pieces of green sticks, say twelve feet long, and four inches in diameter at the small end, lengthwise in the ditch, two at the sides, and one on the top, and covered the same to the depth of twelve or fourteen inches with brush, and sometimes with bogs, grass side down, and straw will answer the same purpose; at the bottom of another, small sticks were placed across the drain resting on either side, with two pieces lengthwise, covered with faggots; this forms a space at the bottom of the drain ten inches high.

Green boughs of any wood thrown promiscuously in a well-shaped ditch, will form a perfect filter for water for thirty-three years, without sign of decay. I saw an instance of this kind in Scotland, where beech had been used in a boggy piece of land thirty-three years before, and when taken out in my presence its bark was perfectly fresh, and no person could have said, it had not been just cut from the tree, and I believe it would, under the same circumstances, have lasted for centuries. In retentive clay land, not apt to crumble, you may fill your drain with your rye or wheat straw; before it decays an arch of clay will be perfectly formed over it, strong enough not only to bear the weight of ground, but all regular farming operations, such as plowing, draining, hay, &c. Through the same species of ground a very neat drain may be formed thus: Dig your ditch tapering from the top to the bottom; in the trench thus formed lay a piece of smooth wood, thirteen feet long, seven inches in diameter at one end and six at the other, then fasten a ring at the thickest end, throw some fine sand on the stick, and pack the clay tightly over it; then draw the stick through the ring with a rope previously attached to the large end, until within twelve or fourteen inches of the small end; repeat this operation until your object is accomplished. Such a drain will last many years. A narrow drain, carefully cut, with an inverted sod properly placed near the bottom, will

carry water a great number of years. A simpler temporary drain may be made on grass land thus: Plow a deep furrow, then trim the sod thus turned over to the thickness of three or four inches, and replace it in the furrow with the grass side up; this leaves the bottom of the furrow open, which will carry off much surface water with no loss of crop. I have made in swamp lands many miles of drains, from five to seven feet deep; on the bottom a three inch chestnut slab plank is placed, and three flat stones so arranged to form a triangle, at the sides of which flat stones are arranged in an upright position, then a covering of flat stones, and a filling of cobble stones three tiers deep; over these inverted bogs, straw or brush before filling in the earth. Thus, you see, the whole mass forms a drain that will carry an immense amount of water.

I have likewise made drains the same shape, and filled them to the depth of two feet with round cobble stones, covered with straw. With a stone wall twelve inches high on each side, covered with flat stones, filled in with small stones, and covered with brush, with vertical flat stones at the bottom standing on edge, covered with rails, filled in with bogs grass side down, and then with earth.

The first year after draining you may be sure that your grain crop will increase in value from a fourth to a sixth, depending upon the previous condition of the land; the second year the crop will be doubled with half the former labor, and a quarter of the manure used before draining. It will enable you to clear your lands perfectly, and to pulverize them completely with little interruption almost immediately after rain, and the farmer will receive annually from 10 to 25 per cent on the cost of drainage. The improvement will consist of the greatly increased quantity of every crop, besides almost a double share of straw for manure, the earlier seeding, cultivation and maturity of grain, and consequently its improvement in quality and weight. It will afford facilities of working the ground early in the spring, the preservation of manures and consequent economy in putting them on. It will also ameliorate the climate, and produce permanent pasture, raise the value of land ten fold, and lessen the expense of labor

30 per cent; but half the quantity of seed will be required, and the farmer will be enabled to double his stock and thus increase the substantial manures. Sometimes soils contain one per cent of sulphate of protoxide of iron (or the green vitriol of the shops), a salt which always exerts a very poisonous action upon all plants; many will not grow upon such a soil; by draining and using lime this salt becomes soluble, and finds its way to the drain by percolation.

Persons who have not had an opportunity of observing the difference between undrained and drained land cannot well judge when land requires drainage, the following description may be of service to such: When land requiring drains is in course of drying up in summer, the soil cracks in all directions, and the surface soon becomes too dry and hard for the growth of plants, and is even difficult to work with spade or plough. When the rains fall these open fissures fill immediately with water, which for the want of an outlet continues in the soil, and renders it wet and totally unfit for successful cultivation. The crops on such a soil in the spring will look sickly and yellow, their parts not being fully developed cause them to grow and ripen unequally, if they come to maturity at all, and they are not apt to, as such a soil has no oxygen in it, absence of which acts precisely the same as a superabundance of carbonic acid would when stagnant water is renewed, the air is renewed to the extent that water contains it in a soluble form. If the water is withdrawn from such a soil, giving access to air, it soon becomes a fruitful and valuable meadow. If an animal is buried in such a soil before draining he does not decay, on account of the absence of oxygen, but putrefies from the action of air contained in him.

Putrefaction is a deoxidizing process which extends to all bodies, even the roots of trees; the moment oxygen is extracted from any substance it putrefies. Air is renewed in a soil by frequent ploughing, which changes the putrefaction of its organic constituents into a process of oxidation, from which time its fertilizing effects increase rapidly, and it is fitted to appropriate in proper quantities carbonic acid gas, water and ammonia, to feed the fully developed plant.

If pasture lands are in need of draining, the grass is very coarse, bitter, and yellow, and the ground is inelastic to the tread in summer, and in winter spongy; fogs frequently rise from such land towards sundown, and induce chills, fever, &c. Should half of such a field be drained, and the balance left undrained, cattle turned upon it to graze will rarely be found except on the drained portion. The extent of draining required on such land may be easily determined by test holes, which may be dug here and there from 4 to 7 feet deep and three feet wide. The water which flows from the sides will plainly show at what depth it is accumulated, and how deep it will be necessary to construct the drains to carry it away. Drains often fail from the want of regularity in inclination when first made. If the fall is not uniform and gradual in the bed of the drain, the water will accumulate at the inequality, and cause permanent stagnation, and consequent loss of fall for a certain length. Therefore you will plainly see that the bottom of the drains must descend in a straight form to the outlet. In order to accomplish this end I make use of three sticks, two of them exactly two feet long, and the third as much longer than two feet as my drain is deep; for example, if the drain is three feet six inches deep, the third stick must be five feet six inches long. The rods must each have cross pieces eight inches long at the end that is to be placed uppermost. The two shorter rods are placed upright, one on the earth on the level with the field at the head of the drain, and the other at the lower end; a person stands at one of the rods and looks over its top, with his eye on a line with the other; a second person then holds the long rod upright in the drain, just resting on the bottom, and walks from one end of the drain to the other, keeping the rod vertical. If, as it is thus moved along, its top always remains in a line with the other two as observed by a person looking over the three, the fall of the drain is uniform, but if it rises above this line at any place, the bottom is too high there, and must be lowered, if it falls below the line the bottom must be raised, thus you will be enabled to render the fall perfectly uniform. The cost in draining depends, firstly upon the nature of the soil in which the drains are made, and secondly upon the depth dug and the materials made use of to fill up.

Draining on clay land may be executed more economically per rod than on any other kind of soil, on account of its firmness. Draining wet and gravelly lands, or clays mixed with sand, is more expensive, as the sides cave, which requires the removal of more earth. Stony and rocky lands are more expensive still, as it is necessary to use pick and bar.

On a loam soil drained four feet deep, with a clay subsoil, the upper ten inches plowed, one man will dig 3½ rods per day, in which time he will throw out ten cubic yards of soil. When drains are made four feet deep, they should range from twenty to thirty feet apart. It sometimes occurs that the water drained from one portion of land may be made to irrigate another. This, to a certain extent, has occurred on my farm; the water from a thirty acre underdrained field is concentrated, and carried along the upper margin of a ten acre lot on a lower level, gradually descending to the Hudson river in an open drain, from which the whole field at certain periods is completely covered with a sheet of water, holding in suspension the soluble parts of the land, more or less manure, and other fertilizing properties. The grass produced by this process is exceedingly luxuriant, and affords ample pasturage, by occasionally removing the stock, and irrigating, for ten head of milch cows, from spring to fall.

Prof. Mapes—As the prices of land advance, the restoration of the swamps and lowlands becomes important. Thousands of acres within ten miles of the city of New-York remain unimproved, but entirely susceptible of being rendered good garden soils, by merely supplying the conditions necessary to secure the decay of the organized matters they contain. The great Newark meadow, and its continuation through all the valley of the Passaic, the Raritan meadow, and many others are of this description. Indeed, this very muck, when decomposed in barn-yards and compost heaps, becomes good manure for many upland farms, while its drainage and amendment in place ensures a most fertile soil. The operations of Messrs Gustin & Co., on the Newark meadow, go to establish this fact beyond dispute. This firm have dug ditches through the meadow, embracing and intersecting one hundred or

more acres, and by the help of a small steam engine, the water is kept pumped out during wet seasons, so as to render the whole highly fertile, and at this time every foot of its area is employed as a nursery, in the highest state of fertility. In some localities, as between Newark and Elizabethtown, the projection of necks of upland to the river, invites the erection of a dyke to keep out the tides, and in this case a short road between the two places could be constructed, in a straight line on the dyke, saving the distance of the long road surrounding the meadow, besides restoring 18,000 acres of now nearly worthless land. These meadows are now covered with flag, three-square cats tail, salt grass, fine salt, black grass, etc., worth scarcely $1 per ton beyond the cost of cutting, and which can only be carted off in the winter when the meadows are frozen. If dyked, the soil instead of being worth $10 or less per acre, would be worth $200, for the cultivation of more valuable crops. Newark and Elizabethtown, by such improvement, would be saved from that scourge, the fever and ague, while the cattle raised by the neighboring farmers would get a better class of food during the winter. The prejudice, however, of some of the old style delvers of the soil, has thus far prevented the improvement. Precedents are not wanted in the very neighborhood of these meadows, which clearly illustrate the fact that the experiment would prove successful—for a few years since, Mr. Anthony Dey and associates, dyked a piece of meadow on the bank of the Passaic, opposite Newark, of the same kind, and the second year this dyked meadow produced good corn crops, and is now selling in town lots as East Newark.

Thousands of acres of inland meadow, now nearly useless, are to be found in the vicinity of Newark, Morristown, Aquackanouk, Belvidere, etc., and notwithstanding the fact that small portions of each of these meadows have been restored by enterprising individuals, still the great mass is left unimproved.

A few years since we published an account of the restoration of part of the great meadow of Sussex county, by Dr. J. Marshall Paul, formerly of Philadelphia, now of Belvidere, N. J., and we then gave an engraving of the tool used by Dr. Paul for the removal of hassocks from the surface, by which he levelled many

acres per day. The shores of Long Island, in many parts, are skirted by such meadows, and unless wanted for building lots as the towns increase, they remain without improvement.

Many thickly settled places about New-York are built on the swamps, by carting the adjacent hills upon them. Part of Jersey City and Williamsburgh are so built. All of those farmers who migrate westward from New Jersey, Long Island, etc , could be supplied with better farms, nearer a market, by a restoration of these meadows. Nor is it confined to these localities alone, for Connecticut, Rhode Island, Massachusetts, and many other States, are similarly situated. It is true that the same kind of treatment may not answer for all localities, but nature points out to the commonest understanding the means by which it may be attained. The first thing to be done is to drain off the water. This may often be done by finding the lowest point, and securing an outlet to a still lower one. Sometimes we find the meadow bounded on one side by a river, and on the other by highlands—a levelling instrument will generally show that a slight and gradual fall occurs towards the river, and the running of an ordinary mole plow, in straight lines from the river to the highland, often renders them dry at once; for if this plow be run every twenty feet, we have open tubes at this distance apart, of three inches diameter, which permits the continued departure of so many streams of water, and renders the surface in a proper condition for the first tillage. When the surface of the meadow is too soft to sustain the cattle or horses for the mole plowing, then an occasional ditch should first be dug from the river to the highland, and perhaps one cross ditch near the highlands to cut off and collect the springs, leading down the water to the river through one of the lateral drains. Then the mole plow may be run between, each of its cuts always commencing fairly at the lowest point, so as to ensure the exit of its contents. In some such meadows or swamps, one ditch will render forty feet on each side fit for sustaining cattle in a few days, and this being worked by the mole plow, in turn dries adjacent portions, so that by occasional rests of a few days the whole may be drained.

When the adjacent highlands will supply stone, or if tile be used, then the ditches may be replaced by thorough draining, and so secure the continuance of their effect without a repetition of the mole plowing. In localities where timber of a proper kind is cheap, the waste portions, such as saw mill slabs, etc., may be used, and thus last for a long time.

In localities where the topography of the country does not supply an outlet for the drains in the ordinary way, then sometimes the digging of a single well in the lower portion during a dry season may drain the meadow, and by carrying drains to this well a large area may be restored. It must be remembered that most inland muck and peat deposits are underlaid by a stratum of clay, and if this is cut through a gravelly stratum is often met with, capable of receiving and distributing immense quantities of water, which finds outlets from springs, wells, etc.

Wells which have but six feet of water, will often furnish several thousand gallons per day without losing their usual depth, and if a corresponding quantity runs into, instead of being removed from such a well, it distributes as fast as received, without any material rise of water in the well.

It should be remembered that these deposits occur by the washing down of the more fertile portions of highland soils, bringing with them decaying vegetation and the soluble portions of adjacent inorganic matter, thus rendering them more replete with the requirements of plants than upland soils, and when freed from excess of water, they often undergo chemical changes which fully prepare them for use, without the assistance of aught else but the exercise of nature's laws, permitted by the removal of water and the admission of air. Occasionally assistance of a chemical kind is required; thus, when the deposit has been mainly supplied from the woods, the quantity of tannic acid is too great to admit of full fertility, and then the addition of lime to correct this acidity and assist in the decomposition of woody fibre, may prove necessary; and, indeed, in some cases small quantities of other inorganic requirements which are plenty in upland soils may be wanted, but analysis will always show what these are, and the

sources whence to obtain them are well understood by all. Where hassocks occur on the surface, they may be turned over after being cut and burned, thus supplying potash and other ingredients; but the paring and burning system, or burning at all of the whole surface, should never be appealed to, for the same results will occur by the certain chemical changes consequent upon cultivation without burning, and will present these results in proximate conditions, instead of ultimates, as when burned. When small quantities of soils can be brought from the adjacent highlands, even when from abrupt sides, furnishing only sub or under soils, they may be thrown on the meadow with profit, for they act as a divisor to the compact organic matter, besides supplying in after time a continuance of inorganic pabulum for crops. Often the sides of the adjacent mountains will furnish old charcoal hearths or charcoal braize, and this is of great value to a restored meadow, for independent of the potash thus furnished, the carbon prevents the soil from breaking, and renders it homogeneous like older soils. Pure gravel may even be profitably used as a divisor, for the chemical action in a decomposing peaty soil is so strong, that the integrants of the gravel will yield at the surface of particles and furnish food for plants. We should be glad to receive any facts in relation to this subject of restoring waste lands and swamps, and shall cheerfully place them before our readers.

Paul Stillman—Does land on which water of rains can stand one day require drainage?

Prof. Mapes replied that drainage was in almost any land an improvement. (See his remarks.)

Dr. Waterbury—When we find rain water standing for a time in old post holes about the farm, draining is indicated. I have seen wells of 8, 16, and 30 feet deep at short distances apart, and the shallow wells contained water, while the 30 feet deep well was dry.

Prof. Mapes—No doubt owing to the interposition of rock or impermeable material of some sort.

Geo. E. Waring—On the subject of the washing down hill of the soils, and modes of arresting this severe loss, remarked that he has recently heard that trench or deep plowing, subsoiling crosswise on side hills, had the effect of forming receptacles for water, and prevented its running off and robbing the soil of its fertility.

John Lodge, of Jersey.—On the asparagus; observed that it is an aquatic plant and loves salt, which ought always to be slightly sowed on the beds. A large amount of this universally loved vegetable can be raised on a comparatively small surface of ground. Long Island yields excellent asparagus. I trench the ground two and an half feet deep, mixing in manure as I dig. This is best when done in the spring. I have already been at work making beds by breaking up frozen surface of the ground with pickaxe, &c. Till your soil ever so deep and the asparagus roots will go to the bottom. Deep spaded land is always warmer and more moist. This is so in old England, where climate is cold, and more moist than ours. I have seen meadows in England good for thirty years with top dressing and care, which are always necessary.

Paul Stillman.—What manures do you use?

Mr. Lodge—The animal and vegetable manures, top dressing of salt, and the fertilizers.

Mr. Meigs reminded the Club, relative to deep tillage of land, that about one hundred years ago, in England, some persons trenched their ground five feet deep, in order to give the roots of their fruit trees room. That experience proved that the advantages to the fruit crop was great, and that it lasted from fourteen to twenty years before it became necessary to trench it over again.

Mr. Lodge—I have found two and one half feet trenching very good for trees.

Prof. Mapes—At all events dig holes deep and wide to set your trees in.

Paul Stillman—How far do roots run?

Mr. Waring has seen roots extend much further than the height of the tree.

Prof. Mapes has seen a root of a tree reach across Broad-street, at Newark, 200 feet long. This is not a common thing.

Subjects adopted for next meeting—"Mauures;" "Spring top dressing of grass and grain;" "New tools for root culture;" and "Drainage."

The distribution of seed was made. Several members took Colza seeds for trial out of the parcels sent to this Club by the Light-house Department of the United States. Members were requested to continue the practice of bringing some of their best grafts, cuttings, and seeds, for exchange with each other at every spring Club. None but good ones are likely to be brought. And each contributor of one sort may take away a great many others.

ADVANCEMENT OF ULTIMATES BY THEIR USE IN ORGANIC NATURE.

Prof. Mapes said—It is well known that analysis has proved, beyond dispute, that all substances in nature are composed of sixty-four simples, which may be considered as having existed in the chaotic period in a divided or æriform shape, and we first find all these substances in rocks. By the debris of these rocks soils were formed, and hence all these substances are found in soils, and the admixture of these soils and the movement of the rocks from place to place, have occurred by convulsions of the earth's surface, change of position of large masses of water, etc.

We next notice these simple substances occupying their places in vegetable and animal matter; but still find large quantities contained in rocks in their primitive form. We also know that any of these substances separated from the rocks may, by chemical means, be produced in what is usually termed a pure form; thus, if a magnesian rock be dissolved in sulphuric acid, and the clear supernatant fluid be evaporated, chrystalization will take place, and these crystals will be the sulphate of magnesia (Epsom salts.) So also, if we take that mineral known as chlor apatite, which is composed of phosphoric acid and lime, and known as

phosphate of lime, that we then have a mineral identical in composition with a calcined bone, which is also phosphate of lime.

Should the sulphate of magnesia after having been obtained in the crystalline form be frequently re-melted and re-crystalized, it will arrive at a condition having different properties from those belonging to the original crystals, although by analysis they will seem to be of the same composition; the one used as a medicine will cause great pain, while the other will produce the same medicinal effects without pain; and, indeed, all the inorganic constituents as taken from rocks may, under certain combinations, form crystalizable substances, which, by repeating the process of crystalization, are rendered more fit for appropriation in organized nature. But when these substances are incorporated, as in a plant, or in an animal, they seem to form a homogeneous mass, having none of the character known as crystalline, not even when examined by the microscope; still, from some microscopic examinations, it is fair to infer that peculiarities of configuration consequent upon composition, do exist. Thus much as a platform for thought.

The chemist tells us by analysis, that blood is composed of certain materials and water. All these materials exist in rocks, and may be separated from them.

Now, let us suppose ten square yards of soil to be fertilized by 10 lbs. of bullock's blood, and another ten square yards of soil to be fertilized by the constituents which analysis shows to exist in ten pounds of blood, and that these constituents shall not only undergo the greatest degree of mechanical division by grinding, but they shall absolutely be placed in solution and applied to the soil, still, notwithstanding this great mechanical sub-division, the ten yards fertilized by the blood will yield double the amount of crop of that fertilized by the same constituents taken from the rocks.

As another instance. Should we fertilize one piece of land with the bones of an animal, previously heated to redness, so as

to drive off the gelatine, fatty matter, etc., and leave phosphate of lime only, dissolving it before its application in sulphuric acid, and should fertilize another similar piece of land with the same amount of phosphate of lime taken from the rock as at the location at Dover, N. J., or Crown Point, Lake Champlain, and dissolve this also in sulphuric acid, we should find that the portion fertilized by the dissolved bones would yield a crop much larger than that arising from the use of dissolved phosphate from the rock.

This gives rise to the question: "Does matter by its entering into animal and vegetable organisms, undergo any changes, which are important for after progression, but which changes are not discoverable by chemical test or microscopic investigation?" All experiments seem to prove, that isometric compounds, although chemically alike, so far as analysis is capable of discovering conditions, really do differ in their adaptability for appropriation in organic life, and thus the ingredients found in the blood or bone of an animal, between the time of its leaving the original rock and becoming blood or bone, may have occupied place in vegetable or animal life a thousand times, at each of which assimilation, growth and decay, it may have been more fully suited for its present advanced purposes, and thus the phosphate of lime and other constituents of blood may differ in their applicability for re-appropriation, from the same materials in a less advanced state. We all know, that, when a plant or animal decays, or is consumed in any way, that its ultimates pass back, either to the soil or the atmosphere, and are re-united in some new organic form; no one particle is ever put out of existence—and may not this be the cause why many manures are to be found so much more effective than others of similar composition?

All know that the ultimates contained in a green crop, when applied to the soil from original sources, will produce no such result, as is consequent upon the plowing under of a green crop.

We all know that night-soil, urine of animals, stable manure, &c., produce effects in vegetablo growth, not to be arrived at by the use of the same constituents, direct from the rocks—and is it not possible, that our present improved plants, improved fruits

and animals, may be the result of this system of progression, in the quality of ultimates and their adaptibility for easy assimilation? We can trace back all our fruits to inferior sources, and our various garden vegetables are of comparatively modern production. The same rule applies with equal force to the animal creation, and possibly from the same causes.

If we refer to the records of animals, as portrayed in Grecian art, we shall discover the probable proof of this assertion. The horses shown in the Elgin Marbles, although replete with beauty from the graceful curved lines in their forms, may be approved of by the artist, but the horse jockey will inform us, that they are far inferior, both for fleetness and strength, to the horses of the present day, and the very horse that carried Romulus into Rome, might have failed, if Remus had mounted him at the same time.

The cattle represented in these marbles, and those represented in Egyptian art, are far inferior in figure and size to the Devons, Durhams, &c., of the present day.

This is not only true of animals, but also of man; for, while we have such exceptions as Goliah of Gath, in ancient history, O'Brien the Irish giant, the Belgian giant, &c., in modern history, we still know that the human race have improved in figure, size, and probably in mental energy. The Eglinton tournament, which occurred in England twelve years since, gave proof of this fact; for the noble youths who wished to emulate their great forefathers on that occasion, found it impossible to wear the suits of armor, which had so long ornamented their baronial halls, and blacksmiths were in active requisition for the enlargement of these mail protectors.

While the useful animals have been continually increasing in size, those which are not required by man, but which were probably required as machines for the progression of ultimates, have either entirely passed out of existence or materially lessened in size; thus the mastodon, which once, as proved by fossil geology, roamed at large over the earth's surface, no longer exists. This animal was capable of consuming immense amounts of vegetable food, and thus presenting it for reappropriation for new forms in

a refined condition. The same may be said of the ancient hyena, whose bones occupy the hyena caves of England, but which does not now exist, the animal of the same name being many times less in size. We find the same true of many of the Saurians, and while the tooth of the largest shark of this time is but an inch high, we find the teeth of antique sharks in the Monmouth marls larger than a human hand. May it not be that as the vegetable kingdom progressed, it ceased to present food sufficiently gross for the use of these animals, while those of finer ultimate structure, composed of more progressed particles, were able to assimilate more progressed food, and thus the useful animals, man included, have all improved.

In the fruits, vegetables, &c., we know this to be true; for we have hundreds of varieties of pears alone which were unknown to our forefathers, and in a greater or less degree we find similar advancement throughout the vegetable world.

May not this principle of nature be equally true in the development of the observant faculties, and consequent ability to examine nature's laws? If the brain be indeed the seat of reason, and its particles be more progressed than those which formed the brain of men and animals long since, why may not the functions be increased in the same ratio? To say that Confucius, Newton, and others, were examples of the past, fully equal to any at the present day, is to admit, that but few exceptions existed, and such exceptions are to be presented against all rules; but the great average mass of nature seems to have followed this law, and a close observance of this truth, if found to be such, would enable the physician to select the materials composing his medicines, from that portion of advanced nature, which would furnish the ultimates at the proper degree of progression.

The farmer might also learn, that both his soil and the fertilizers used, have certain power consequent upon their advanced state, and when used for raising the most progressed species of plants, it may be necessary to select the most progressed kind of fertilizers, or those containing ultimates which have for the longest time, and during the greatest number of changes, occupied organic

nature. May it not be possible that the raising of seeds, when to be used as such, should always occur in the oldest and most highly balanced soils, and that all fertilizers used upon them, should be from the most highly organized sources? We know that seeds contain a large amount of nitrogen, and we know also, that the blood and feces of man, and of the more progressed animals, also contain very large amounts of nitrogen, as compared with their inorganic constituents, and as the food is selected from the highest of organized nature, it is fair to infer, that for this reason, in part, the inorganic matter is required from such sources, for perfect seed raising.

Indeed, if this hypothesis can be sustained, it will act as a guide, not only for present investigation, but for the examination of natural laws, which now seem to be beyond the comprehension of man.—Ed.

The Club then adjourned.

H. MEIGS, *Secretary.*

March 20, 1855.

Present—R. L. Pell, President of the Institution, Hon. R. S. Livingston, Prof. Mapes, Messrs. Clapp, Toucey, Pardee, Dr. Waterbury, and others. Seventy-six members.

President Pell in the Chair.

Henry Meigs, Secretary.

The Secretary remarked that we may the better know our relative position to other nations, by comparing their progress in agriculture with our own, he therefore quoted from Paris the following account of a Belgium Cattle Show held recently.

[Annales de la Societie Imperiale D'Horticulture. Paris. Dec. 1854. Extracts translated by Henry Meigs.]

Fair of the National Central Society of Agriculture of Belgium, was held at Brussels, on the 23d, 24th, 25th and 27th of September last. It was *all agricultural and nothing else.*

It certainly was brilliant for the number and beauty of the objects in it. We counted no less than 222 horses, 46 bulls, 263 cows, 119 sheep, 47 hogs, 18 goats, 81 rabbits, 211 cocks and hens, 5 turkies, 6 geese, 24 ducks, and more than 200 agricultural implements and machines. *The vegetable products were not admitted in the exhibition!*

This society was founded in December, 1853, and now counts 2000 members. After the fair was closed, 300 of the members enjoyed a splendid banquet.

We visited the gardens of Messrs. Van Houtte and Van Claert, at Ghent. It is impossible to see anywhere, anything comparable to the very beautiful growing orchidiæ of M. Van Houtte. We particularly admired the rich collection of begonias and a lapageria rosea in full bloom, covering the whole vault of the conservatory. The aquarium (pond) is very beautiful. The regina victoria was in flower. Splendid! surrounded by nympheacæ. We remarked especially the *nymphæa-orlgiesiana*, the *lata*, the *odorata*, the *scutifolia*, the *terminalis*, the *culvea*, and lastly, the *euryale ferox*, which is very curious on account of its leaves being furnished with sharp points.

The Chairman called up the first question before the Club—"Drainage."

The Chairman called Judge Livingston to take the Chair, and he took the floor, and remarked that

At the last meeting of our Club, I confined my remarks to farm drainage, and will now say a few words respecting the drainage of land forming the sites of towns.

Town drainage may be considered as two-fold: simple water drainage, and foul water drainage. The first is the removal from the suburbs and sites of towns all superfluous water, which naturally causes dampness. The second is the removal from dwellings, or their vicinity, all solid matters that can be carried off by water.

Simple water drainage is generally neglected, as may be observed by examining the foundations of houses, which are often

damp from the retentiveness of the soil on which they are constructed.

This dampness rises by absorption to the upper floors of the house in proportion to the absorbent nature of the materials used for building; after these houses have been occupied for some time, fevers of a typhoid form are generated and much aggravated by the dampness. Whenever I see houses springing into existence on inefficiently drained impervious clay land, I can at once foretel bilious, typhus, and intermitting fevers, rheumatism, colds, scrofula and sundry other diseases, all the consequence of dampness. Toward sun-down from any elevated contiguous piece of ground, you may observe white fogs overhanging such a district, plainly indicating to the physician the location where his attendance will always be required. Good drainage will remove the cause of these mists, and insure the health of the district. Such vapors arising from dampness, form a vehicle for the diffusion of the emanations from cesspools of noxious gases and decomposing vegetable and animal substances, which are inhaled morning, noon and night by the residents, depressing their spirits, and inducing the use of liquors, opium and other stimulants to relieve them from the feeling of oppression. It has been supposed by persons who have not had much practical knowledge of town drainage, that the water from the roofs of dwellings, as well as from streets, should be separated from the refuse removed by house drains, and carried away by separate drains, but the fact is, that water from the roofs contains soot and dirt, and is actually as foul as sewer water, therefore it would be unnecessary to go to the expense of a double set of drains. The complete drainage of the agricultural portion of the natural drainage area in which a town is placed, is of great importance to prepare it for the reception of the town manures, particularly if they are to be applied in a liquid form, by sewage irrigation, and also for the drainage of the roads, to enhance their durability and usefulness. The interest of every town and city urgently demand particular attention to the drainage of its suburban land; for excess of moisture most powerfully influences the local climate, both as to dryness and temperature, as is shown under the following heads:

1st. Excess of moisture, even on lands not evidently wet, is a cause of fogs, mists and damps

2d. Dampness serves as the medium of conveyance for any decomposing matter that may be evolved, and adds to the injurious effects of such matter in the atmosphere; in other words, the excess of moisture increases and aggravates atmospheric impurity.

3d. The evaporation of the surplus moisture lowers temperature, produces chills, and creates the sudden fluctuations, by which health is injured.

Where there is a great accumulation of surplus moisture, having animal or vegetable matter in solution or suspension, the injury to the public health is so considerable, as to amount to a nuisance, requiring authoritative intervention of the civil authorities. These evils are found in the greatest intensity in low-lying town districts, in valleys near rivers, or on sites below high water mark. In draining it is necessary to find the springs first, as they are the source from whence our trouble comes; they may be viewed as artesian wells, and may be explained on the same principles. Rain falling on hills runs over the surface to all lower levels. If in its progress it passes over clay or impervious rock, it cannot sink; if it encounters a pervious layer, such as gravel, it at once sinks and flows in the interstices as in a pipe, until it reaches an impervious layer, and, being unable to descend, it comes to the surface and forms a marsh. The rule to be followed when dealing with such cases, is to cut of the water as near its sources as possible, by running a drain along the line of out-crop, or in other words, between the wet and the dry, or a little below the commencement of the marsh. The water, so intercepted, may be conveyed to lower levels. The principle is,

1st. Upon discovering the main spring, without which nothing can be done, and

2d. Upon obtaining the level of that spring, and finding its underground bearings, for, if you should be so unfortunate as to cut three feet beyond the line of the spring, you cannot by any chance reach the water, that issues from it; by discovering that line, you can cut off the spring with certainty, and drain the land in the must effectual and cheapest manner.

3. When it is impossible to make the drain sufficiently deep on account of level, use the auger to tap the spring.

In regard to the construction of drains, attention may be called to the following points:

1. The direction of drains; they should always run down the steepest descent, and parallel to each other; by observing this rule, the water has the shortest way to percolate in reaching the drain, and consequent early delivery into the drain; both points of great importance. It has been argued that drains should be directed in an oblique form, but practice now uniformly favors the straight down hill direction. The direction of the mains depends entirely upon the value of the ground and levels. When the surface is undulating, the rule is to lay a main of sufficient size along the principal hollow, with sub-mains along all the secondary hollows, the small mains opening into these at right angles.

2. The frequency of small drains. The distance at which the small drains are placed apart depends on several circumstances, such as the texture of the soil, the depth of the drains, and whether it is only surface water that they have to deliver. A drain that has eighteen inches sectional capacity, when running half full at the outlet, will discharge in twenty-four hours, six hundred tons of water, equal to a rain fall of nearly six inches in depth on an acre. One inch in depth is a very heavy fall in a day, and it usually takes two days for the water, after rain, to drain entirely from land deeply drained. Eighteen such drains on an acre, would discharge when half filled four and a half inches of a rain fall from the same in one hour, and in six hours more than a whole annual fall of rain. Still, through the ignorance of the owners, lands have been so drained. The condition of lands throughout districts in the suburbs of cities and towns should be examined by means of test holes, as explained at the last meeting of the club. The information obtainable by this means consists of

1. A knowledge of the nature of the land in a district, and its capabilities.

2. The state of each district as to drainage, or the want of it.

3. The relative condition of adjacent districts, and how far the want of discharge in one district affects others.

4. Whether the superfluous water in any particular locality arises from springs, or whether it is rain water retained in the soil.

5. Whether water in sufficient quantity to be useful, could be collected by drainage.

6. The most suitable localities for reservoirs for collecting such waters.

To secure the salubrity of a residence the drainage should be deep and close; its high value will enable the owner to bear a large expenditure to secure the advantage.

Sewers in cities are often constructed with flat bottoms; this is wrong; the water spreads, increases the friction, retards the flow, and soon accumulates a deposit; with circular sewers the amount of deposit is small in comparison.

The smaller the quantity of water to be discharged, the greater ought to be the care in the concentration of the flow and in the construction of the sewers intended for its conveyance.

It has been found that pipes with the same diameter, exactitude of form, was of more importance than smoothness of surface; that glass pipes which had a wavy surface, discharged less water at the same inclination than clay pipes of exact construction. By means of this exactitude, and with pipes of the same diameters, an increased discharge of water, amounting to one fourth was effected within the same time. Therefore, by a careful construction of agricultural or city drain pipes, the same effects may be produced with pipes of less size than those in common use; accuracy in the forms of jointing is likewise indispensable.

In respect to town drainage, the practice of architects and engineers has been to enlarge the area of any main pipe in the proportion of the sectional area of each junction into it; whereas it has been found, that the addition of eight junctions, each of three inches diameter, into a main line of pipe of only four inches di-

ameter, so increased the velocity of the stream, that there was no increase of its sectional area.

It has been observed that a three inch pipe serving as the main outfall for the drainage of an area of ten acres of land was never more than half filled, indicating the expediency of making land drainage pipes still smaller, improving their manufacture, and making them more exact in form, and laying them more accurately.

The annual rain that falls is about forty per cent, and only twenty-five per cent of that which falls from October to March passes back to the atmosphere by evaporation, but from April to September, inclusive, ninety-two per cent is evaporated. In August the soil is in its driest state, but still filtration takes place. If all the water derived from rain during the six colder months of the year were allowed to accumulate in the soil, such land would be perfectly wet, and require the whole of that period, by the unaided force of evaporation, to keep it in a uniform moist condition, while deep-covered drains would relieve the same soils of excess of moisture in a few hours after every shower, even in the rainy season. The excess of rain water to be disposed of during the six coldest months by some other process than evaporation amounts to no less a weight than one thousand and fifty tons per acre. Parts of our city are badly drained, and the streets become receptacles for refuse and excrementitious matters, which tend much to increase the mortality; in fact, the average age of our inhabitants does not exceed twenty-one years. In 1844 more than 33,000 of our population lived in badly drained courts and alleys, and nearly seven thousand in cellars. In these dark, damp, chilly places, fevers and other contagious and inflammatory diseases prevailed. In Philadelphia half of those born die before the fifth year, and twenty-seven per cent before the forty-sixth year. In Bethnal Green, one of the worst districts in London, it is forty-nine years, and the average in London is fifty-three years. Absence of drains and deficient sewerage tend to increase the mortality of cities by contaminating the air which its inhabitants are compelled to breathe. The calculation is that each individual requires a daily supply of more than six hundred cubic feet of pure air to main-

tain the healthy composition of his blood; there will be no difficulty in understanding why, if six hundred cubic feet of tainted air be supplied to him instead, and that constantly and habitually, the chance, or rather the certainty, is, that he must die early. The nature of the effluvia arising from cess-pools and other like places is most deadly, being chiefly sulphuretted hydrogen, two or three cubic inches of which causes sudden death when injected into a vein, or into the chest, or even beneath the skin of animals. A rabbit died in ten minutes after being enclosed in a bag containing sulphuretted hydrogen, although its head was left free so as to allow it to breathe the pure atmosphere. Nine quarts injected into the intestines of a horse killed him in sixty seconds. It is impossible to keep horses in fine condition in the vicinity of large water closets, where sulphuretted hydrogen is abundantly given out. A dog was killed by being made to breathe a mixture of one part of this gas with eight hundred parts of common air; and air containing only one fifteen-hundredth part of sulphuretted hydrogen proves speedily fatal to small birds. Persons employed in cleaning these places often become faint, delirious, and insensible, and are sometimes attacked with convulsions, twitchings of the muscles, and excessive prostration of strength. These effluvia are constantly breathed by the inhabitants of our badly drained back streets and courts, to the constant detriment of their health. No cellar in this or any other city should be allowed to be inhabited unless situated in a street that is sewered, and where the sewer is below the level of the cellar floor; and every such cellar should have a properly constructed drain, communicating with the sewer. It is much to be regretted that our country—and we copy after England in this respect—should permit public health to occupy such a very subordinate place in the estimation of the public authorities. In this respect we are both far behind other countries. In France, for example, the promotion of the public health is a constant object of solicitude, not only with the government, but the municipal councils. They have in Paris a Council of Health, appointed by the Prefect of Police, and to this body questions of medical police are constantly referred by the government. In the city of Geneva, Switzerland, the average

o death is the highest yet ascertained of the whole population of any city, being upwards of forty years, or at least ten years higher than in New York; the births but slightly exceed the deaths, and there is but a slow increase of the population. They pay great attention to drainage, temperance and cleanliness, and do not permit the refuse matters to be discharged from towns and buildings, consisting of disintegrated debris of pavements, superfluous rain water, solid and liquid excrementitious matters, the products of combustion, and the refuse of vegetable and animal substances, besides sundry waste matters used in manufactures, into the streets, but through proper subterranean channels to a lower level, where by artificial means they are rendered fit for agricultural purposes. Our city is admirably situated to accomplish this most desirable end, and seven hundred thousand acres of land might be rendered fertile annually if the refuse could be collected on the banks of our noble rivers in proper reservoirs, and when deprived of the liquids, be conveyed in suitable barges to the agricultural districts. The purposes of drainage of towns and cities are twofold, to wit: the supply of water, and the isposal of refuse substances. Who will deny that there is not water enough to supply all the demands of this great city within twenty feet of the surface, if by proper drainage the filth had been prevented from contaminating the spring veins by percolation.

Mr. Clapp, referring to the drainage of cities, would suggest that some better method should be adopted to cleanse sewers. The stench, especially in summer, from the "breathing holes" was very deleterious. He would propose that there be connection between the large mains and sewers established occasionally by the opening of a gate between them; that when the water was running to waste this might conveniently be done.

Mr. Purdy said, health, cleanliness, and comfort were important. In this city and others, there are little yards undrained and comparatively useless. It is of no possible use attempting to cultivate little plots in the city, unless the soil be made deep and

thorough. If, from a plot of twenty-five feet by fifty, the old soil be removed and properly replaced, valuable luxuries may be raised. If well drained, the partial absence of the sun from overshadowing buildings would not be so strongly felt. A great deal of lettuce, fruit, and tomatoes may be raised there, by good under drainage and the supply of proper manure, and soil, bones, leather, hair, or lime mixed with it. An asparagus bed might be constructed after good trenching.

Mr. Clapp explained his plan more fully. The opening of the main, say in Chambers-street, would be in the sewers, the torrent of water in a few hours would effectually flush the sewer. Large additional mains for this purpose would be money well expended. We have much surplus water. In the summer season, take the sewer that is most filthy, open the gate and clear it.

Mr. Waring said that this valuable matter ought not to be thrown away or sent into the river.

Mr. Clapp said it was better to lose manure than to lose life.

The Secretary said that the present state of opinion among practical men in London, is that the separation of the water from the sewerage is too expensive.

Mr. Waring then resumed the discussion of the subject of manures, left incomplete at a former meeting. In combating the views which had been expressed by Dr. Waterbury, he contended that the Doctor's theory, namely, that the waste of fertilizing material is necessary; that land must manure itself, or in other words, that farming is not profitable on land that requires manuring; that we are to avoid the modern English system of farming; that our true policy requires emigration to the unexhausted lands of the west. With all of these positions he presumed to differ. He stated his firm belief that the waste of manures to the extent to which it now exists, is so far from being necessary that it entails a positive loss. He thought that no land can sufficiently manure itself unless it be allowed to retain its whole crop, and that our most profitable farming will be such an improvement on the English system as will increase our energy in saving and ap-

plying manures. If we spread devastation over the eastern part of this continent, and then migrate westward, we fall far short of fulfilling our mission. Let us cultivate one acre carefully and thoroughly, before we meddle with a second.

Geo. E. Waring, jr., objected to Mr. Clapp's idea, for the reason that he hoped to see the sewerage of the city (which would be worth for manure over $12,000 per day,) saved for agricultura uses.

Judge Meigs said that it had been decided in London that town sewerage could not be availed of.

Mr. Waring said that the Yankees would do it yet, and indeed the meadows near Edinburgh have been brought from barrenness to a state of the highest fertility by the use of sewerage. The same is successfully adopted in Manchester, and I believe in various other foreign towns.

The subject of manures being then taken up,

Geo. E. Waring made a reply to Dr. Waterbury, on the subject of manures, according to a request made at the meeting at which Dr. W. read a paper on these matters. He said that the position of the Doctor, that "the present drainage and waste of fertilizing substances was necessary," is entirely false. The washing away of manurial substances is an evidence of prodigality and ignorance, and should never be permitted by any people. Why, Mr. Chairman, the gentleman actually brings up, as an instance of the ability of the soil to maintain its own character, the fact that China supports a dense population without the *importation* of food; but, sir, he seems to overlook the fact that she also avoids the *exportation* of any fertilizing matter, (except in minute quantities in tea, &c.,) and that the waste of any animal excrement is a *crime;* even the fæces of the people are so treated that no part of their mineral constituents can be lost. Were not this the case, sir, China would have been depopulated a thousand years ago. They place there no dependence on the restoration of mineral matter, and they are calumniated by the supposition of improvidence.

There are, Mr. Chairman, many sources for the restoration of mineral matter from the sea. Among those are the importation of guano, the use of fish as food, the application of shells to the soil, the manufacture of fish-oils and sea-salt; evaporation, the wafting of spray to land, &c. But these are by no means sufficient for the return of all that is lost by the improvident treatment of manures and crops. The gentleman again says, that "land must manure itself," he believing that it is unprofitable to cultivate such fields as do not regain their lost ingredients, (supposing that to be lost temporarily, which has entered the structure of a plant.) We all know, Mr. Chairman, how few acres there are which are subject to such restitution. Indeed, I may say that but few soils not subject to irrigation, ever have their constituents returned by natural means. Of course, in nature, where every tree decays on the spot which gave it birth, its parts return to their starting place. But, sir, let the hand of art place that tree in the form of timbers in the hull of a ship, and let them be cast on a foreign shore, and who, sir, will believe that its inorganic atoms find their way, by any *natural* process, back to the soil from which they were derived. Now, sir, this is but an illustration of what occurs in ordinary farming. If we raise clover or buckwheat for a green crop, and plow it under, we, of course, return to the soil all that the crop takes from it, in addition to the organic matter taken from the atmosphere; whereas, if we *remove* the crop, we remove with it a part of the organic soil, and although the decay of roots may have increased its organic matter, it will have lost some of its mineral constituents, and the only way by which this can be replaced, is by the artificial application of manures. No land not irrigated, or otherwise supplied by nature with its lost parts can be profitably cultivated. There is not a field in the world which, from its own resources, can sustain the removal of crops without loss of parts, and these parts *must* be returned, or it will each year become less able to supply the requirements of crops. Certainly, sir, this is a plain question of addition and subtraction, and no man of common sense can fail to see its bearing. One more point, sir, and I have done. Dr. Waterbury advises us to leave our present farms and remove

o the unexhausted lands of the west. Pray, sir, and for what? Has our office become that of the locust? Must we commit devastation on our eastern lands, and then carry our earth butchery to the west? Prairies are not inexhaustible. Let an emigration from the east "develope their resources" for 100 years, and then we shall find a reduction of fertility which would astonish many of our believers in eternal fertility. My doctrine, sir, is to cultivate carefully and thoroughly one acre of our land before we commence with the second. Let us recollect our old principles of making two blades of grass grow where but one grew before, rather than reduce our productions from the larger to the smaller number.

Prof. Mapes answered Dr. Waterbury's objections to analysis in a most able manner. He said that the fact of the value of analysis was too well established to admit of doubt, and he defied any man to bring an instance of its failure, when its teachings had been followed. G. Washington Park Custis, of Arlington, and John Jones, of Delaware, were cited as men whose practice would support his assertion. They both acknowledged frankly that they owed their success almost entirely to the assistance of the chemist.

Mr. Lodge advocated, in connection with the use of the proper measures, the thorough cultivation of the soil to great depth. Crops are often deficient because their roots are not allowed to penetrate the soil. The food is often there, but is kept out of reach. The best crop of corn I ever raised, was made by deep plowing on a soil previously almost worthless. Prof. Mapes said that a deepening of one inch in the surface plowing of our whole country, would add more to its wealth than has the gold of California, or the importation of guano from the Lobos Islands.

Mr. Coleman, of Brooklyn, was pleased to have Mr. Pell's ideas and experience on drainage, of the high importance of which he was fully convinced some time ago.

Mr. Cummings, the younger, has superintended the construction of sewers in this city for several years past, and was of opinion that, from their vertical elliptic figure, and the smooth stone

bottom, a little raised above the brick work, they carry off their contents perfectly. That the bad smells occasionally issuing from the mouths of the drains, are owing to the collection of filth in side pipes. But that the mains were generally clear, and would bear to be flushed with the Croton water, properly applied.

Mr. Bowman thought, however, that great care was required in flushing them, not to allow them to be filled with the head of the water on them, for that would inevitably burst them.

The Secretary thought it would do good to recall the evidence of the Atto ney General of the United States, the Hon. Reverdy Johnson, as to the great benefit of applying chemical science to agriculture; communicated to him by Mr. Johnson in August, 1851. Mr. Johnson purchased about 300 acres of land impoverished by long continued bad husbandry, about $2\frac{1}{2}$ miles west of Baltimore. Its soil contains a very large proportion of iron. So complete was the exhaustion that 200 acres of it, carefully cleared up of briars, sassefras, and other bushes, did not furnish one load of materials for manure. Mr. Johnson cultivated ten acres of it in the usual manner, and with ordinary care and an average good season. The ten acres did not produce one peck of corn to the acre!

He applied to Dr. David Stewart, of Baltimore, distiuguished as a scientific man, and engaged him to examine this land and find some remedy. Dr. Stewart went to the farm, selected parcels of the soil in various parts of the field; he carefully analysed them and found nothing wanting in them except phosphoric acid, of which there was not a trace in this soil! Dr. Stewart then prescribed a chemical composition which was evenly scattered over the ten acres, it cost ten dollars an acre!—one hundred dollars. Wheat was planted in November, and harrowed in; no barn yard or other manure of any kind being used. The crop was twenty nine bushels an acre, although badly harvested, nor the field afterwards raked. Here was a Waterloo victory of science!

Dr. Stewart said that the prejudice against scientific farming is so powerful, that those who suggest it are liable to personal abuse.

SANDY LANDS.

The Secretary said that the celebrated horticulturist of Belgium, Van Houtte, was patronized by the government some few years ago, and was offered the choice of certain lands. He selected some acres of a desert of blowing sand which had never been cultivated, at least not for ages. He had decided on making soils to suit himself; and as there were no ready-made soils that came up to the standard, he chose to begin with the sand. In a very few years, by adding all the elements required by his immense variety of plants, he has made the best garden in the world perhaps.

The sandy lands of New Jersey are now discovered to be worth something In many locations the green sand marl has been discovered under the surface, and otherwise. By adding which, together with all other wanted ingredients, those blowing sands have already begun to blow in a better sense, honorable to the knowledge of man, *i. e.*, to bloom with precious crops.

Long Island is in the same stage of existence. After her people had looked on her sands for 200 years, without thinking that it was in human sagacity or work to alter and amend them, she now receives Van Houtte folks, who do know how to alter and mend them; and those who are here 25 years hence will stare at Long Island. Sandy farms made into good loam, and worth $100 an acre or more. The same lands which, seven years ago, could not be sold for three dollars an acre, and hardly given away.

The Chairman, Judge Livingston, called for question for next meeting.

"Agricultural Implements" as ordered.

The Club adjourned to Tuesday, 27th March, at noon.

H. MEIGS, *Secretary.*

FARMERS' CLUB, *March* 27, 1855.

Present—Messrs. R. L. Pell, Taylor, Toucey, Sandford, Clapp, Barney, Lowe, Birdseye, Pardee, Coleman, Lodge of Jersey, B. Pike, sen., do, Bowman, Silliman, P. B. Mead, Prof. Mapes, Dr. Waterbury, Dr. Wellington, John A Bunting, Judge Scoville, Mr. Leigh, Colonel Travers, &c.—70 members in all.

President Pell in the chair. Henry Meigs, Secretary.

The Secretary read the following papers prepared by him, and extracts:

[London Farmers' Magazine, March, 1855. Extract by the Secretary.]

Mr. Mechi argues strongly in favor of measures for saving and applying the sewerage of London for fertilizing the land. The water meadows of Edinburgh were adverted to. In 1826 some of these acres were let for £20 to £50 each. The grass on them was cut not less than six times a year, with as heavy a swathe as a man could cut with a scythe; this was used as feed for cows.

The most astonishing results were at Mansfield, where the meadows were irrigated by a stream that runs through the town, of not half the strength of the liquid manure of Edinburgh. These meadows once leased at four shillings and six pence an acre, and farmed at great expense, were levelled by the Duke of Portland, and then brought £11 an acre, more than fifty times as much. Mr. Chadwick said the meadows of Edinburgh had proved injurious to the public health. Mr. Nesbit said that accurate experiments showed an average deposit per annum of solid excrement of the human species was 1,100 lbs. weight of urine and 150 lbs. of solid, worth about 12 to 15 shillings sterling ($3 to $4) per person. Easy to save the solid but not the liquid. The manure of London was worth from £1,500,000 to £2,000,000.

[Journal of Agriculture and the Transactions of the Highland and Agricultural Society of Scotland. March, 1855. Extracts by H. Meigs.]

Auxiliaries to Farm Yard Dung.

It is now generally admitted that British agriculture cannot be profitably carried on without an extensive use of special or arti-

ficial manures as auxiliaries to the ordinary farm yard muck. The remunerating increased produce obtained from the application of the light manure to the grain crops have created a demand for them that few, some years ago, even dreamed of. Even long before thorough drainage wrought such a change in British agriculture, by the extension of the green crop culture, it was found that the manure made on the farm was not sufficient to restore its exhausted fertility. The history of the use of auxiliary manures is interesting: we will only state that, so far as we are informed, bones and rape cake were brought into use a little after the middle of the last century. In 1770 Arthur Young says: "Bones are a very odd manure, but farmers find them of great benefit to their clay lands, and they will last twenty years good." Marshall, in his "Rural Economy," published in 1795, mentions one farmer on the north-eastern coast of Norfolk who had laid out £800 ($4,000) in the course of twenty years for rape cake for manure, at the rate of £2 to £3 per ton. They mention the cores of horns crushed in mills for manure, and oil cake also.

There is no part of a farmer's business requires more judgment and caution than the selection and purchase of special manures, such as will best suit his own farm, for the difference between two adjoining fields has been found to be great.

The value of any manure is determined by those substances containing nitrogen and those containing phosphoric acid. The former are most important, although we cannot subscribe to the sweeping conclusion at which Mr. Pusey has arrived, viz: "that substances strengthen vegetation mainly by their contents of nitrogen," &c.

We express no opinion as to whether plants derive their nitrogen immediately from ammonia or nitric acid, leaving that to chemists, who will have some difficulty in the investigation.

On Elementary Agricultural Education.

Douglas, in his essay on the "Advancement of Society," says well: "Pre-eminent among the arts, and *far surpassing them all*, agriculture ought to occupy special attention, since by its *rise*

everything else is *raised*, and by its improvement the whole of life becomes progressive."

On the Salt best adapted for Dairy purposes.

Long a question among dairy farmers, and fanciful prejudices exist regarding it. *Bay salt*, long supposed the best. This is produced in Spain by evaporation of sea-water let into shallow ponds at high tide. Its crystals are of considerable size, and of a brownish color. It is a very pure salt, in spite of its color, and contains very little of the magnesian compounds of sea water, Salt containing chloride of magnesium and sulphate of magnesia. contains also much water, say 3 per cent of the chloride and 7 to 8 per cent of water, leaving only 89 to 90 per cent of pure salt. This will not answer for the dairy.

The Veterinary College

Is conducted by Prof Dick, with the assistance of Dr. George Wilson and Messrs. Barlow, Dun and Worthington. The curriculum (circus) embraces the principles and practices of veterinary medicine and surgery, with anatomy, physiology and demonstrations, chemistry, materia medica, and dietetics, and the general management of domesticated animals.

Students have the advantage of assisting in an extensive practice, and of performing the different operations which most frequently occur.

Attendance upon two courses is required before a student is taken upon trial for diploma. The examinations are conducted by Prof. Goodsin and the leading members of the medical faculty, and the graduates of the college are eligible for appointments as veterinary surgeons in her Majesty's service and that of the East India Company.

[Highland and Agricultural Society. January, 1855. Extract by H. Meigs.]

REAPERS.

A research for the original contrivance for reaping.

Pliny the elder, who was born in A. D. 23, 1832 years ago, gives a description of a reaper which was in use in Gaul (France)

in his day, that machine bearing off the ears of wheat by *catching them between knives* placed at a small distance apart, projecting from the front of a cart which was pushed forward by an ox or oxen.

The first patent granted in England for reaping machines was to Joseph Boyce of London, in 1799. A series of knives projecting from the edge of a revolving disk.

One to Robert Meares of Frome, in Essex, in 1800. One somewhat similar.

One to Thomas James Plucknett of Deptford, August 23, 1805. The cutter, or flat steel plate with keen edge, revolving by means of the wheels of the machine.

One to Donald Cumming, a farmer in Northumberland, July 26, 1811.

One to Dobbs, an actor, in 1814. He cut wheat with it on the stage of the theatre.

One to Edwin Budding of Stroud, 1830, to shave lawns.

One to John Duncan, of London, November 2, 1840.

One to Charles Phillips of Chipping Norton, Engineer, May 20, 1841.

One to do, 1843.

One to Matthew Gibson of New Castle on Tyne, Aug. 22, 1846.

One *steam mowing* machine to Sir John Scott Lillie of Fulham, Middlesex, Oct. 14, 1847.

Dr. Waterbury: As I disclaim the views attributed to me, in the dictatorial form in which they are reported, permit me to make some brief corrections. The purport of that paper was to the effect:

That without the use of any foreign fertilizer, produce enough may be sold off from a farm in most portions of the Union to pay the expenses of conducting it; and yet, by judicious management, the soil may be annually improving in condition;

That this can be effected easiest in those portions of the Union where the value of land is least, and where, consequently, the farms are largest, and the longest rotations of crops can be profitably resorted to;

That no system of farming is deserving of our attention that does not recognize the necessity of farm exports;

That a State may, to some extent, export agricultural products without diminishing in capability to produce them;

That an inspection of the census returns of the United States and of the State of New York, shows that the amount of crops of this State has increased for the last ten years much faster than the area of improved lands in the State, and that consequently the land cannot be "running out;"

That the processes of Nature, to which we owe the present alluvial condition of the surface of the earth are still at work, and that land left entirely to itself will, by the action of water and vegetation, improve in fertility;

That the process of tillage alone may be made to accelerate this improvement and help to provide for the necessary waste of marketing;

That rain penetrates the porous parts of the earth's surface and percolates through them until it comes to impervious strata, and that it runs along this impervious strata until it finds egress as springs, and that spring water is always impregnated, more or less, with saline substances;

That the evaporation which is continually going on of the water from the surface of the earth, leaves the saline matter in the surface, as but a small part of the water that falls as rain ever reaches the sea;

That the mineral springs of Saratoga and other localities are exaggerated illustrations of this process, and the more fertile condition of valleys is to be in part referred to the same cause;

That, in the present thinly populated condition of our continent, the true purpose of American agriculture at this time is to wisely direct these natural forces, rather than apply pinches of guano, and tea spoonfuls of super-phosphates to individual plants,

although such applications may pay on some farms, and probably do pay well on all market-gardening operations.

The objection to soil analysis is this:

The difference between the early soil of Virginia and the same soil in its present condition, has been made by the loss of 1,200 lbs. of alkalies to the acre. But this 1,200 lbs. forms not quite three-ten-thousandths (000.27) of the soil to the depth of a foot.

The idea that any amount of variation within such infinitessimal limits can be measured and defined by quantitive analysis, is absurd. Top-dressing of the same amount would, in the same way fail of being detected.

That directions given by agricultural chemists have led to successful results, is undoubtedly true; but these directions have been founded rather upon experience and observation than upon chemical analysis.

It is scarcely necessary to add that so far from apologising for any unnecessary waste of fertilising materials, it was the object of that paper to advocate such policy as will save and appropriate the greatest aggregate amount of the manures produced in the country, and effect this at the least expense. It is also encouraging to notice that those new avenues of internal communication that are opening to us the great fields of the west, and supplying us with its cheap products, are at the same time extending the area over which manures may be profitably distributed from the cities.

Prof. Mapes, said that Mr. Munday, of New-Jersey, had just returned from California, and brought with him some specimens of the extraordinary growths of that singular country. There are oat stalks of nine feet high; potatoes of several pounds weight; barley 149 23-50 to the acre; wheat 82½ bushels an acre.

Mr. Chambers: B. P. Johnson, Esq., Secretary of the State Agricultural Society, presents some cuttings of the large and fine grapes of California.

Prof. Mapes was asked to explain some cultivators; Knox and others, he illustrated on the black board; and also his new forking machine, (Mapes and Gibbs,) now ready for actual trial at his farm at Newark, New-Jersey. He made drawings on the blackboard which fully demonstrated the true character of it. The Professor's late invention, the sole plough—which is a small one drawn deep through the soil, lifting the ground as it goes only about an inch or two, which leaves the ground on the surface so as to enable the revolving forks to penetrate to the depth of fifteen inches and pulverise the earth perfectly to the breadth of four feet. The whole machine being drawn along about as fast as oxen usually draw the plow.

Mr. Meigs believed that no nation has ever yet possessed an implement of one-tenth the value of this forker, if it performs the work now attributed to it; not more on account of its rapid tillage than the peculiar action of it in pulverizing and mixing the constituents of the soil, and moreover in leaving its work behind it untrodden, for all other plowing compels men and cattle to tread on their work to great damage for plants.

Mr. Chambers introduced on the table a splendid Yam, admirably cooked. The members tasted it with butter and salt, and a very general expression of approval of its quality was given. In taste it resembled the boiled chestnut, and in appearance new cheese. No fibre whatever was in it. The whole root weighed thirty-five pounds. The thanks of the club were voted to Signor Jose M. Moralez, of Havana, who presented it through the mercantile house of Mr. Henry A. Coit, of this city.

This root is very wholesome.

Dr. Wellington: Some one said half boil and then fry it; but that process renders it indigestible.

Mr. Clapp explained the form and action of the lime-spreader spoken of. It was a cylinder on wheels, with horizontal slats so near together as to permit at every revolution so much lime to escape between the slats as the farmer chooses. It is very easily

made and is very effective in an even and rapid spreading of the lime.

John Lodge, of Jersey, had practiced lime spreading these 40 years in his gardening and farming. He carted on the land quick lime directly from the kiln; laid it in small heaps at proper distances apart—put some soil over them, which had the effect of slaking the lime, thus giving the land the whole benefit. The heaps were afterwards scattered as evenly as possible over all the field.

The President called on the members to propose subjects for the next meeting.

"Agricultural implements ordered to be continued, and grafting to be considered."

President Pell remarked that scientific men in Germany now say that the goodness of the soil depends upon its inorganic constituents, so far at least, as they are soluble in water, or through a continued action of carbonic acid. And in no case do the organic substances contained in the ground perform any direct part of the nutrition of plants.

The annual destruction of organic matter over the earth is estimated at two and a quarter billions of cubic feet; and if all vegetation depends upon organic matter for nutrition, to satisfy this consumption, there must have been five thousand years back, ten feet deep of pure organic substance on its surface.

In a plant of any of our ordinary crops, more than two hudred grains of water must pass through it for a single grain of solid substance to accumulate within it. The evaporation from an acre of wheat during the period of its growth, is 114,860 gallons of water, about 73,510,000 gallons per square mile; with clover it is more, with peas less.

One thousand pounds of dry calcareous sand will gain two pounds weight of moisture in twelve hours.

An acre of poor grass has been known to exhale, in one hundred and twenty days of active vegetation, six millions of pounds

of water. To supply the exigencies of the plants, therefore, it is only necessary for the meadow to imbibe three and a half grains of carbonic acid gas with every pound of water.

The supply of nitrogen must be independent of the soil.

With respect to ammonia, one thirtieth of a grain in every pound of water is sufficient for the exigencies of vegetation, and there is probably no spring of water in the earth that contains so little.

As to sulphur and phosphorus, the quantity needed by vegetation is 540,000th of a grain of sulphuretted hydrogen per cubic foot, diffused through the atmosphere to a height of three thousand feet. Mr. Baudrimont, of Bordeaux, says there exists in the soil interstitial currents, which exert an influence on agriculture; there is a natural process at work, by which liquid currents rise to the surface from a certain depth in the ground, and thus bring up materials that help to maintain its fertility, or to modify its character. He explains many phenomena of agriculture and vegetation hitherto inexplicable by his theory, and admits of no relation between the fertility of a soil and the quantity of fertilising matter expended upon it. He says the goodness of a soil depends upon its inorganic constituents. Seed from a barren soil is likely to be more true to its kind than well manured land. Land can be plowed too much, because of the too frequent loosening of the soil the decomposition of humus is so rapid as to overbalance the benefit supposed to arise from exposure to the atmosphere. The Rev. S. Smith, of Germany, took a field of four acres, that had been tilled one hundred years, and plowed it thoroughly; he then sowed grains of wheat three inches apart in the rows, and the rows a foot apart, and left three feet between each three rows, which he trenched with the spade in the fall, and scarified in the spring. When harvested, the yield was forty bushels per acre. The adjoining field had four plowings, ten tons of manure, seven times more seed, and yielded a quarter less to the acre. He repeated this experiment for years with the same result.

It is estimated that the human race, a thousand million of men, consume annually four million four hundred and eighty thousand pounds of tobacco, which, at eight hundred pounds per acre, would require five and a half millions of acres of rich land to be kept constantly under tobacco cultivation.

Dr. Waterbury—If we compare together some of the leading articles used by animals for food, we shall find that they differ after the following fashion in the *proximate* elements of which they are composed. In the following table* the first column expresses the per centage of albumen, caseine and gluten, what Leibig calls the "plastic elements of nutrition" found in these substances; the second column the starch, gummy and fatty matters devoted to the support of respiration and the production of heat, while the third column expresses the ash or bone earth. The quantities refer to the substances dry.

	MOTION. Blood and muscle.	HEAT. Lactic acid and fat.†	BONES. Plant ash and bone earth.
Wheat, per cent, ...	22.75	73.23	3.02
"	29.00	77.29	2.71
"	19.50	77.65	2.85
"	16.25	83.00	2.75
"	11.20	86.68	2.12
Oats, "	14.39	82.36	3.25
Barley, "	13.96	82.94	3.10
Rye, "	13.50	83.99	2.60
Maize, "	12.50	86.25	1.25
Rice, "	7.05	92.10	.90
Potatoe‡ "	5.77‡	.....	....
Carrot "	4.69‡	.....	.60

Derived, as these tables have been, from an exclusive European source, their correspondence with the relative value put on these substances by trade as articles of feed in this country is certainly very striking. From them it results that a pound of root crop is worth

* Gathered out of Pereira.

† Vegetable fibre has been included also in this column.

‡ Some specimens of potatoe are said to rank as high as 10 per cent in proteine elements.

about one-third what a pound of oats are, and about two-fifths what a pound of corn is, as materials for the production of motion, (that is what is technically termed "hard feed.") As the root crops lose most in drying, the balance is more heavily against them in the condition in which feed is commonly used. By allowing for the difference in weight of the bushel of those different substances, their relative value by the bushel as "feed," for the production of motion, may be ascertained.

Taking the potato and the carrot then as representatives of this class of crops, we must come to the conclusion that they can never successfully compete with the grains as a material for the nutrition of muscle. There is not a stage line in the country that could do a weeks work on them. No root-eating animal is of sprightly natural movement. The Irish nation has grown pot-bellied and bow-legged by feeding too much on potatoes, and the root-eating Indians of western America are at the bottom of the scale of humanity, a full grade below the rice-eating Orientals or the fish and worm-eating Polynesians, or the oil-consuming Esquimaux, and the same law holds true to great extent with individual animals. Once born, the only difference that can be made in the constitution of an animal is by feeding, and by that exercise that appropriates the feed, and a judicious system of management in these respects may effect wonders. Cassius cried—

> "Upon what *meat* doth this our Cæsar feed,
> That he is grown so great ?"

But roots have their uses in the animal economy. We were told two thousand years ago that it was not good for man to live on bread alone, indeed so well established was this natural truth that it was used then as a medium for conveying a moral lesson, though French philosophy claims it for yesterday. The food of animals must be of a mixed nature, in order to meet all their wants, and it must vary in the relative amount of its component parts with the variation in the habits of life of the animal. The only safe guide to the correct relative quantiti s of different substances is appetite. If a horse is supplied with hay, oats, straw, carrots and water in such a way that he may partake of them at his option, he will take different relative quantities of

each, and also different amounts in the aggregate as he labors or stands still. It is only when animals have been long deprived of some one kind of food that they may not be trusted with an unlimited supply. Whenever these instincts are interfered with, whenever the appetite of the animal does not succeed in effecting that combination of food that is best adapted to the wants of its system, (as when the food is deficient in azotized matter,) in order to obtain the requisite amount of the one ingredient a larger amount of the whole is taken, and the waste matter is passed off undigested. It is not only a cruel but a wasteful practice to keep stock through the winter on one kind of food. Any one who has tried to winter horses on hay alone will bear witness to the enormous amount they will consume. This then is the pathology of indigestion, whether it occur with men or horses, for horses do have the dispepsia. Your ox is more grossly made, but even he has it when confined to browse. This disease is nothing but an incorrect adaptation of the food to the habits of living and the, diarrhœa, the "scouring" that comes on is from the irritation occasioned in the bowels by the surplus undigested matter. Now roots, and more especially carrots, are said to not only afford their own nutriment but to aid in some way in the digestion of this crude surplus. However this may be it is certain that barn yard fowls fare the worse where carrots are fed to horses in the proportion of one bushel to four of oats. This effect has been ascribed to the *pectic acids*

It is not so much then as an *aliment* as a *condiment* that roots are useful feed, for we do never practically, for economical reasons, reach a perfect combination of food. It is as much, probably, in promoting complete digestion as it is in furnishing nutriment themselves that they act—that they produce that peculiar change in the ordure of horses fed on them during the winter assimilating it to that of summer. Water contains no nourishment, and yet we know it to be necessary, and the argument for the necessity of root feed is of a like nature. In his extremity a man will give all his substance for a draught of water, and the present high price of potatoes and garden vegetables proves them of like necessity without implying that they are eminently nutritious.

But there is a further use to which these crops are admirably adapted—to butter making. The time is not far hence; nay, sir, I believe that it ought to have already come, when farmers will restrict the extent of their pastures to such fields as cannot be made into meadow on account of uneven surface—when cattle will be fed on old hay and roots through the months of April and May; when every farmer will be heavily enough stocked to make clean work of the flush of feed in June; and when green crops for soiling will come in rotation, clover, sanfoin, corn, &c., for the remainder of the season. The amount of stock kept in this way in the country might be twice what it is now without clearing another foot of land. Every man who keeps his horses in the stable summers, and cuts grass for them, understands this, and will not believe this estimate extravagant; and when we take into consideration the amount of labor spent on the inside fences of the farm—a work that is avoided by the soiling policy—the difference in expense for men is not so great as it might seem. A number of large dairies in this State are practising this plan, and all those agricultural implements that lengthen our arms like mowing machines and reaping machines, and the little truck cultivation, and the seed sower, tend to hasten its general adoption. The English practice of manuring root crops has arisen from the fact that they have no crop on which the manure can be more profitably used. But we have such a crop in corn—a gross feeder—one whose roots extend down into the soil in spite of any obstacle of mechanical condition, if its food be there; and more than all, one that cannot be cloyed with too high feed. What could we desire more to precede roots? It was shown here, sir, on a former occasion that the amount of the corn crop on old land depended on the quantity of manure used rather than on the amount of surface over which the manure was spread; that to turn manure into corn to profit it should not be spread over too much ground; that it ought to be thick enough to raise over fifty bushels of shelled corn to the acre; and allow me to add, sir, to-day, my conviction, that if the land in this State, annually manured and planted to corn, were made less by one half or two-thirds, so much less as to produce at least sixty bushels of shelled corn to the acre, and the same land planted to carrots, beets and turnips

the next year, the yield of roots would be over 800 bushels to the acre. There would be an advance in the annual value of the corn crop of one fourth while the root crop would even exceed in value the hay. To effect all this we lack only cheap and effective methods of culture; we lack only what steam has done for transportation. The high price of labor is all that stands in the way of these changes in farm policy, and that obstacle is daily becoming less by the influx of foreign population.

The root crop should be sown directly after the corn is planted. The carrots that I have sown before planting have been the best. The ground should be ploughed deep, subsoiled, not trench ploughed, as the earth from below delays the germination of the seed. The rows should be perfectly straight as this facilitates culture. The surface should be finely pulverized; the drills level and trodden, or otherwise marked, so that they may be hoed between with the broad hoe, even before the young plants can be clearly distinguished. The secret of success lies in the first month. If the rows do not come up evenly water the poor spots with sink slops, or other liquid manure. After preparing ground for such crops it should not be allowed to lie before being sown, as this gives the weeds the start of the drills. I have never been able to get along with less than three hoeings, and believe three pays best. After they are sufficiently grown, running the plough through them every two or three weeks for the remainder of the season is of benefit. Turnips and beets must be thinned in the rows or they will not bottom with turnips. This operation ought not to be performed, nor, indeed, the weeds removed from the rows until they get the third leaf, as they in this way escape the bugs better. The rows should be two feet apart for horse culture. Turnips in the row may be ten inches or a foot; beets not quite so far; and as for carrots I believe the yield has been greatest in the thickest rows; yet there must be some limit to this.

Of these roots, the carrot, and more particularly, the parsnip, have naturalised themselves and become indigenous. It is a significant fact, that in field margins, along highways, and in waste places, they sow themselves and struggle with the stones for a footing, and yet live and hand down life from generation to gene-

ration in succession. Does this indicate that they would bear fall sowing, and would the crop be increased in quantity and quality as wheat is? Or does the acrimony and reputed poisonous nature of the wild carrot and parsnip arise from the fall sowing it gets naturally? Of the parsnip, Callen, writing nearly a century ago, says: "The quantity of nourishment contained in it is great. From the parsnep a small quantity of grained sugar and a large one of syrup is extracted, very viscid, with a copious mucillage. "It is said," he continues, "that parsnips, when old, turn very acrid, insomuch as to have produced mania and other dreadful effects. When old, they are called *madness* by the English." It is curious to notice that, speaking at the same time of the potato, he thought it necessary to combat the popular prejudice against its use. He asserts it to be, in his opinion, "of the most innocent and safest nutriment," and remarks incidentally, that it had then "become of frequent use." Notwithstanding this advantage of the carrot on the start, how does the race they have run during this hundred years, and their present position in popular estimation, compare with the figures: Potato, 5.77; carrot, 4.67.

Without depreciating, then, in any measure, the absolute importance of the root crop, it may be remarked, that it does not take, and ought not to take, as prominent a relative place in our rotation as it does in the English. To our corn crop, and pumpkin crop, and apple crop, there is nothing in their system that corresponds; and the influence that these crops exert with us over the productions of pork and beef, are not fully appreciated the other side of the Atlantic. Our Indian corn crop alone, of these three, is second in value only to the great northern staple of hay, and where it can be raised, is the most important crop of the season, even exceeding in value the wheat, so that it becomes the key to most of the American systems of rotation. There is no word in the European languages that corresponds to "new land," in our acceptation of that term, and our fallow, with its stumps and roots, and entire absence of weeds, and in fact of all vegetation, is entirely American. The condition of our prairies, too, is entirely unrecognized by their dogmas; dogmas that have never yet been able to comprehend the great practical fact that

we have hundreds of thousands of acres of unbroken land which may be purchased for the price of a day's work per acre, which may now be used for the production of wheat, beef, and pork, and to which, in ten years, steam will have opened a free communication.

To us in these circumstances, what solemn mockery is there in the doctrine of dibbling and spade culture! There was a Yankee, once, who assumed a public professorship of whittling, and for the consideration of a shilling, gave advice in the premises. All who had consulted him, said his advice was good and sound, and well worth heeding, and advised their neighbors to do as they had done, go and obtain it. It was this, "Whittle from you and you won't cut you;" true enough in itself, based, indeed, on first principles; yet it must be confessed, of not much practical utility to a *shingle weaver*. So it is with trans-Atlantic teachings, when we have sifted out the principles on which they are based, we shall find the rest chaff.

Our fathers, on coming to the country, had well nigh famished ere they could shake off these cere cloths of European precedent, ere they could fully comprehend the new order of things. There the circumstances into which they came, and under which we practice, have stimulated invention until such perfection has been attained in our implements as the world has never seen. Axes superior in temper to Damascus steel, and perfect in shape. Hay forks whose tines are subtile as pipe stems, yet stronger than British bayonets. Scythes that hold an edge better than did the fabulous sword of Sigismund, and harvesters that sweep like tornadoes. Who ever saw a European ax, or fork, or scythe, or hoe, or rake? Who does not recognize, instantly, the clumsy figure of these in their cuts? How stupid to represent Time with wings and yet with an *English scythe!* or to call Death a *reaper!*—as incongruous in essence, as to arm them with scissors and pen knife. Time should drive a western mowing machine, and Death carry a grain cradle on his hip.

If this then is our true relation to the root crop, it should be raised in the eastern portions of the Union and in the dairying

districts, for the sake of the nourishment it affords, while in the western states it should be raised in less quantities, (as other articles of feed are cheaper,) as a sauce for stock. The late Judge Buel, supposed that turnips might be produced for five cents a bushel, yet costing twice that, I have found them to pay very well fed to cows during winter, at the rate of half a bushel a day. When corn can be raised for ten cents, and oats for six or seven, of course these crops challenge the time that would otherwise be spent on roots.

The richer the land on which these crops are put, at the less expense will they be produced. This is true certainly up to a crop of 1,200 bushels to the acre, and probably much further; and it is very doubtful whether a crop of less than eight hundred bushels to the acre will pay for feeding purposes. I say for feeding purposes because the retail, or even the wholesale prices of these crops, in cities and villages, is not to be taken into the account. The question to the farmer is, what do these crops cost in labor and use of land, and what corresponding increase do they gain in the amount of stock I can keep and annually sell? Allowing any other consideration of value to come in only embarrasses us and vitiates our conclusions.

Were these crops uow raised to the amount that they will be yet for stock, there would not be a market for a hundredth part of them for any culinary purpose.

But there is but a small part of the land in this country that is in a condition to raise roots profitably. There are muck deposits along the banks of rivers; there are deltas at the mouths of creeks, and there are swamps that may be drained. One of the largest root crops in this State, was raised last season by Col. Wheeler of Deposit, in the muck of a drained swamp. Such land also possesses the advantage of being free from weeds.

We might amuse ourselves by estimating the amount of stock that the country would keep if every acre of land should raise a thousand bushels of these roots. There is but one objection to this diversion, and that is that it would be of no manner of use. An acre planted to roots must derive strength for the time being

in the shape of manure from a score or two of other acres, though once in such condition it ought always to remain in heart; hence the amount of these crops that a farm can produce at first is limited, yet annually increases, for the raisin gof roots and feeding of stock is after all one of the most effectual means of improving land.

I know sir that in this way, by root crops and soiling, a cow may be kept the year round on two acres of land, though it is customary now to allow two acres of pasture only.

It is unnecessary to speculate on the origin of the elements of improved fertility. The present condition of English soil is a practical illustration of what root crops can do and what they will do for us when the inevitable destiny of low wages for human toil and a crowded population shall have been fulfilled upon us.

But gentlemen excuse me for being so prolix. My peck of roots has become a heaped bushel, and as they have lain over a year some of them may have become a little spongy, but such as they are they are at your service.

MECHANICS' CLUB.

Organized March 2d, 1854.

The Mechanics' Club of the American Institute is under the supervision of the Board of Sciences and Arts.

The following are the Rules and Regulations, as reported to the Institute by the Board of Manufactures, Arts and Sciences, and adopted by them on the second day of March, 1854:

Article 1st. A Club for the promotion of manufactures and the arts, and for the discussion of mechanical subjects, is created under the name of *Mechanics' Club*.

2d. The Mechanics' Club is an agent of the Committee of Arts and Sciences, and is under its entire control, in the same manner as the Farmers' Club is of the Committee of Agriculture. The transactions of the Club are in the name of the American Institute.

3d. The Committee of Arts and Sciences appoint, annually, the Chairman and Secretary of the Mechanics' Club. In the absence of the Chairman and Secretary, persons to supply their places will be chosen at the meetings of the Club.

4th. Such papers read at the Mechanics' Club as are accepted for that purpose will be provided under the direction and at the expense of the American Institute, which also provides a place of meeting, lights and fires. No other expenses are to be incurred except by special appropriation of the American Institute, according to its Rules and By-Laws, nor any liability incurred by the Institute except on special resolution.

5th. The meetings of the Mechanics' Club are free of all expense to those who attend them.

6th. The Mechanics' Club shall select, in advance, a subject for discussion at each of its meetings, which subject shall be announced in the call of its meetings.

7th. Written communications to the Club are to be read by the Secretary, unless objection be made, and if objected to will be read, if it be so ordered by a majority of the members present.

8th. The Mechanics' Club will recommend what papers read before them or what part of other transactions they judge worthy of publication, to the Committee of Arts and Sciences, by which the publication may be ordered in its discretion.

9th. No person attending the meetings of the Club shall speak more than once on any one subject, nor shall occupy in such speech more than fifteen minutes, except by permission of the Club.

10th. No argument is allowed between members. Facts alone are to be stated.

11th. All questions of order are decided, without appeal, by the presiding officer.

12th. The meetings of the Mechanics' Club are held at the Repository of the American Institute, No. 351 Broadway, in the city of New-York, on the first and third Mondays of every month, at o'clock.

All which is respectfully submitted.

NEW-YORK, *February* 15, 1854.

(Signed) JAMES RENWICK, *Chairman.*

T. B. STILLMAN, F. J. MAPES, } *Committee.*

The first meeting of the Club was held on the 15th day of January, 1855.

Meeting of members of the American Institute to organize a Mechanics' Club.—Present 20 members.

Mr. Pell, President of the American Institute, called the meeting to order, and Mr. Meigs, Recording Secretary, read a paper, being the rules and regulations adopted by the committee on arts and sciences, relative to the formation of such Club, as determined by that committee, the said Club to be under the general guidance of said committee on arts and sciences.

Mr. Joseph P. Simpson was made chairman for the evening, and Mr. Samuel H. Maynard, Secretary.

Mr. A. H. Everett suggested, as a question appropriate for discussion, "Will the addition of sand in large quantities increase the amount of steam from a common steam-boiler, other things being in the same condition?"

Mr. Edward W. Serrell proposed—"What effect will a jet of cold air have upon the effective force of a steam-engine if ejected into the cylinder of the engine while in operation?"

Mr. J. K. Fisher suggested—"Have the improvements in the construction of steam engines within twenty-five years been such as to warrant the belief that they may be applicable to locomotion on common roads?"

Mr. E. A. Serrell read an original paper on the mechanicians and mechanical engineering of the age, prefaced by some very pertinent remarks, relative to the purposes and the advantages of an organization of the character commenced.

Mr. J. P. Pirsson moved that the thanks of the club be extended to Mr. Serrell for the very able and interesting paper read by him, and that a copy be requested for preservation in the archives of the Club. Carried unanimously.

Mr. Samuel W. Serrell suggested, as a question for discussion, "Is there any advantage to be gained by supplying steam to the cylinder of an engine for more than one-third of the stroke?"

Mr. Robert Stewart proposed—"Is it probable that the ingenuity of man will so control the electricity of the heavens that it will become subservient to his use as a motive power?"

A standing committee of three was, on motion, appointed to receive questions and present them, if, after due examination, they shall find that the discussion of said questions will not be prejudicial to the rights of individuals.

Moved and carried, that the first question, being that proposed by Mr. A H. Everett, be taken up as the subject of discussion at next meeting; this was, however, reconsidered at the request of the mover, as it was believed that the discussion of this at present would be injurious to the inventor of the plan, and the second question, that offered by Mr. E. A. Serrell, was then fixed upon.

The Chair named Messrs. J. K. Fisher, S. H. Maynard, S. W. Serrell, as the standing committee on the subject of questions.

Many gentlemen present handed in their names as desirous of being considered members of the Club, after which the meeting was declared adjourned to the first Monday in February.

S. H. MAYNARD, *Secretary.*

February 5, 1855.

A meeting of the Mechanics' Club of the American Institute, was held this day, Monday, Feb. 5, at 7½ o'clock.

Robert L. Pell, President of the Institute in the Chair. Henry Meigs, Secretary *pro tempore.*

The secretary read the following proceedings of the committee of Manufactures, Science and the Arts, appointing a permanent chairman and secretery.

A meeting of the committee of Manufactures, Science and Arts, was held this day, Thursday, Feb. 1, 1855.

Present—Messrs. James Renwick, Edwin Smith and John J. Mapes.

Professor Renwick in the chair, and John W. Chambers, secretary.

The subject of appointing a permanent chairman and secretary of the Mechanics' Club was considered.

On motion of Prof. Mapes, seconded by Mr. Smith,

Mr. H. B. Renwick was appointed the chairman, and Henry Meigs the secretary.

And after it was read the President, Mr. Pell, resigned the chair to Henry B. Renwick.

Henry B. Renwick in the chair. Henry Meigs, secretary.

The minutes of last meeting, (which was the first held by this club,) by Secretary Maynard, were read and approved.

Professor James Renwick read a note from Mr. Storms objecting to the open discussion of the subject of this meeting, (viz.) "Injection of cold air into the cylinder of a steam engine while in operation." After discussion,

Prof. Renwick moved to postpone the discussion.

The question of cut off being stated by Mr. Fisher.

Further discussion ensued, in which Messrs. Hyde, Fisher, Meigs, Nash, Copeland, E. W. Serrell, Ediwn Smith, Simpson, Maynard, the Chairman and Prof. Renwick, took part, on the subject of cut off in the steam engine, and said that it should be reserved by the club for further discussion. It was a good subject.

Mr. E. W. Serrell moved to narrow the question.

Mr. Copeland moved to discuss the mere simple question of cut-off; to narrow the question as much as possible, and whether working steam expansively is to be preferred.

Mr. Fisher moved that Mr. Copeland's motion as to the subject for discussion at the next meeting of the club be adopted. Carried unanimously.

The question was then reduced to writing by Mr. Copeland, and is as follows:

"The most economical point at which to cut off the steam supplied, 1st. To non-condensing engines; and 2nd. To condensing engines, irrespective of the character of the work to be performed."

Mr. Hyde moved the adoption of the following resolution, viz:

Resolved, That the Mechanics' Club of the American Institute ask the privilege of the American Institute to pass such rules for its deliberations (not inconsistent with the rules of the Institute,) as the club may decide on, and that the chairman appoint a committee of one to ask such privileges and report to the club.

Seconded and carried.

Mr. Maynard moved also that the club have power to select its times of meeting. Carried.

The chairman appointed Mr. Maynard to that committee.

The club then adjourned to the third Monday of Feb. inst.

H. MEIGS, *Secretary*.

February 19, 1855.

Present—Messrs. President Pell, H. B. Renwick, Maynard, Everett, of the Navy, Engineer; Jos. P. Simpson, J. K. Fisher, Lemuel W. Serrell; Messrs. Steele, Son and McKenzie, of Jersey city; Chambers, and others—twenty-two.

Henry B. Renwick in the chair. Henry Meigs, secretary.

The minutes of the last meeting were read and approved.

The Secretary called the attention of the Club to the subject of electro-magnetic motive power, and read the remarks on that question of Prof. Page, from the last Polytechnic Journal, in which the Professor speaks confidently of the near approach of such power being economically employed in numerous cases, with signal advantage over steam, or any other motive power whatever. The Secretary recommended the question to the further consideration of the Club.

The Chairman stated the question for discussion proposed by Engineer Copeland, (viz:) "The most economical point at which to cut off the steam supplied, 1st. To non-condensing engines; and 2nd. To condensing engines, irrespective of the character of the work to be performed."

Mr. Copeland not being present,

James K. Fisher called the attention of the Club to a drawing exhibiting a plan of cut off, and also on a drawing-board.

Philip McKenzie, of Jersey city, stated that he was now experimenting on the subject, and will inform the Club of the results.

Lemuel W. Serrell illustrated his views upon the drawing-board.

The Chairman called on members to give their opinions. There being hesitation on that point, the Chairman called Mr. Maynard to the chair, and took to the drawing board, on which he illustrated his views of the subject.

Engineer Everett remarked that this was a very interesting and important question, and he hoped that it would be continued for discussion at the next meeting of the club.

Mr. Fisher thought that the proper size of locomotive cylinders should be considered in reference to this question.

On motion of Mr. Simpson, the Copeland question was ordered to be continued at the next meeting.

Mr. Maynard, from the committee on the selection of questions, mentioned some questions, which were thought proper for the club. One, the Lighthouse, which Lieut. Bartlett, of the U. S. Navy, would perhaps explain, with the light, before the club. Another, Is the Minie gun, the best?

Mr. Maynard desired that the question to be discussed should be published time enough to enable gentlemen to prepare themselves for the proper discussion of it. He then moved an adjournment.

The Club adjourned to the first Monday of March next, the 5th, at 7½ P. M.

March 5th, 1855.

Present—President, R. L. Pell; Engineers, Everett, of the U. S. Navy; Storms, Edward Serrell, Lemuel Serrell, John K. Fisher, Maynard, and Messrs. Backus, Godwin, Jos. P. Simpson and others. 29 members in all.

A note from the chairman, Henry B. Renwick, Esq. to the secretary was read, stating his indisposition, disabling him from taking the chair this evening.

President Pell then called Engineer Fish to the chair, by vote of the clerk. Henry Meigs, Secretary.

The minutes of the last meeting were read and approved.

The chairman then stated the question for discussion, viz: "The most economical point at which to cut off the steam, supplied, *first*, to non-condensing engines, and *second*, to condensing engines, irrespective of the character of the work to be performed."

Mr. Copeland, who proposed the question, being absent, Engineer Everett read an essay upon the question, illustrating his views by drawings on the black board.

The chairman called on Engineer Maynard, to state his conclusion on the point.

Mr. Maynard disclaimed any pretension to decide this point, among engineers of so much experience as those here; but he had indulged himself in a theory, grown out of his limited reading and experience, which he would venture to state. (See his written statement of that theory.)

Engineer Edward Serrell explained his views of the effects of the cut off, and the throttle valve, and referred to his illustrations upon the black board. We refer to his written statement for the remarks which fell from him; for we would not permit ourselves to trust a report of them to any one; being, as they are, purely technical and scientific.

Engineer Millington—From his experience no great importance can be attached to the operation from either, the cut off or the throttle valve; but all was due to the character and quantity of the steam, in all cases.

Mr. Godwin remarked, that, although he was not an engineer, he was a plumber and had given much attention to the steam engine on land and sea. He had examined the boilers of land and of marine engines, in reference to the efficiency of the practice of pumping out and of blowing off, to clean the boilers, &c.

Engineer Edward Serrell, observed, that the question of throttle valves and cut offs, were in truth not so important in their scientific operation; for, after all, it reduces itself to a question, purely of dollars and cents, *to save the cost of making steam!* Quite an interesting conversation was maintained among the engineers.

On motion the question of cut off was laid on the table for the present, and

Mr. Maynard moved, that the following question be adopted for the next meeting, viz: "Is the principle of the Minié or expanding bullet, capable of affording either greater range or greater accuracy, than is obtained by breech-loading guns?" Adopted unanimously.

Mr. Maynard—The committee of one, appointed by the Club at its last meeting, to request of the Institute power to alter and amend the rules prescribed for the clerk, by the Committee of Arts and Sciences: Reported, that the Institute at its last regular meeting had unanimously authorized the Committee of Arts and Sciences, to make any alterations and amendments in said rules, which appeared to the committee proper.

At a quarter to 11 o'clock, P. M., the Club adjourned to the third Monday of March, inst., the 19th, at 7½ o'clock, P. M.

H. MEIGS, *Secretary.*

MECHANICS' CLUB,
March 19th, 1855.

Present—Engineers Renwick, Lemuel Serrell, Maynard, Fisher, Streble, and Messrs. Pell, Geissenheimer, and others—27 members.

President Henry B. Renwick, in the chair. Henry Meigs Secretary.

The minutes of the last meeting were read and approved.

The Secretary read the following:

[For the American Institute Mechanic's Club. Extract by H. Meigs from the Mechanics' Magazine, London, Jan. 27, 1855.]

"THE RIFLE AND THE EXPANDING RIFLE SHOT.

"As to the intention of the government (British) for the future, Mr. S. Herbert stated in the House of Commons, that it was resolved to arm the whole of the troops with the Minié rifle, and that they were being issued to them as fast as they could be supplied from the manufactory.

"More than a year ago Lord Hardinge, Commander-in-Chief, reported to her Majesty the Queen, that I am the original inventor of the elongated exploding rifle shot. His Majesty the Emperor of the French, out of his private purse, presented Capt. Minié with 20,000 francs, for putting an iron cup or culot (bottom) into the hollow base of this shot; and Lord Raglan, as Master General of the Ordnance, prevailed on the British government to give Mr. Pritchett, an intelligent gun-maker, a thousand pounds sterling for allowing my rifle shot to remain as it was, without the addition of the iron cup. J. NORTON."

"*December* 23, 1854."

[Extract from the New Haven Palladium.]

"We have seen and fired a pistol, recently invented and patented, which bids fair to excel everything in that line that has yet been offered to the public attention.

"It seems to combine all that could be desired in such a weapon. Colt's pistol, compared with it, seems like a distortion, or a clumsy, uncouth, and ridiculous affair for a fire-arm. The volcanic pistol carries a Minié or conical ball, in a rifle barrel, and will put it through a three inch plank at a distance of ninety rods, (say 500 yards.) The receiving tube will hold ten ball cartridges which may be put in it in *two seconds*. The pistol may be discharged *thirty times* in *fifty seconds*, and is so contrived as to be not liable to accidental discharge. There is no priming, no cap, no danger therefore to the eye, no recoil, to disturb a true aim. It is so simple that it cannot get out of order, even in long

use. The powder and ball are covered in the same metallic case or cover, so that one may swim a river with these pistols in his belt, without the least damage to the powder. It is, in short, the most perfect thing in the shooting line that we ever took in our hands.

President Pell remarked—Is the principle of the Minié or expanding bullet capable of affording either greater range or greater accuracy than is obtained by breech loading guns? Wherein consists the difference in the practice of the new rifle and the old?

It is not in the gun, but in the ball, or that part of the charge which generates the projectile force. The improvement consists entirely in the form of the ball, which is made conical, with a hollow recess at the base, into which a metallic plug is thrust by the discharge. The plug is so constructed that when driven into the ball it compresses its outer edges against the sides of the barrel, and at the same time forces a portion of the lead, from its ductility, to enter the groove, and to give the ball, when discharged, that revolving motion, which carries with such unerring certainty to the mark.

By experiments tried in England at a distance of seven hundred yards, with a Minié rifle, only one bullet missed the target out of twelve; the eleven were scattered from six inches to four feet from the bull's eye. At eight hundred yards, three shots missed the target, and the remaining nine passed through boards two inches thick, and lodged at a distance of twenty yards behind. The same results were obtained at nine hundred yards; and at one thousand yards there were but very few bullets that did not enter the target.

In these experiments the rifle was supported, and the sight graduated to a scale, in the ratio of the distance, varying from one hundred to one thousand yards, which latter may be considered the range of this destructive instrument. We have telescopic rifles, loaded at the breech, that will throw shot two hundred and twenty yards distance, into a circle of one and a half inches diameter, and at four hundred and forty yards, into a circle eight inches in diameter.

Captain Minie's ball is not the best, for the reason that after nine or ten discharges the barrel of the gun becomes clogged with lead, and cannot be loaded without thorough cleaning. The principal object is to prevent windage, and this has been obtained in a simpler and more advantageous manner by different forms of elongated balls.

The hollow ball without an iron cap was thought to answer the purpose equally as well, without leading the barrel.

The elongated ball is better than all when firing at a long range; the elongated form causes the ball to fly end foremost like an arrow, and to adapt itself to the parabolic curve described by its flight, whereas the round ball does not follow the line of curvature, and at the latter part of its course the spiral motion imparted to it is at right angles to its descent. A new bullet has been patented in England which promises to supercede the minie ball; it is externally of the form of the minie, and is cast upon a cap of stout metal plate, tinned, the cap being formed upon the principle of a copper cap. The tin and lead unite together. The powder forces out the sides, and the tin plate keeps them in that position, so as to insure perfect rifling. The entire bullet does not exceed the weight of the ordinary round ball.

The experiments that have been tried at a range varying from two hundred to two thousand yards were perfectly successful; the bulls eye was struck several times at four hundred yards. A correspondent of the *Tribune* reports that there is now in the hands of more than fifteen thousand of the French army a gun which is loaded with a balle-a-tige, with which a well practiced soldier will hit a man thirteen hundred yards off. It is of peculiar construction, to wit: there is a stout pin three-sixteenths of an inch in diameter, which is screwed into the breech; upon it the ball strikes when put into the barrel; this pin is surrounded by powder. A heavy iron ramrod, concave at the end, is used, which strikes down the ball, and causes the pin to enter it, spreading it out on all sides firmly against the walls of the barrel. The same principle is produced in both balls; the balle-a-tige by slugging, the minie by explosion. The balls both possess precisely the same exterior form and weight.

By this principle any old uncertain musket is immediately converted into a close shooting rifle, of most extraordinary range, before which no field artillery known to science could sustain itself, and must therefore be restricted to siege operations and the defence of fortified places, and heavy cavalry can no longer be used with effect. To show the difference in power and execution between the musket with round ball loaded at the breech, and the improved musket with balle-a-tige, four French regiments were required to fire three hundred thousand balls, one half out of muskets with round balls, and the other half out of muskets with balles-a-tige and minie balls. At one hundred and fifty yards the improved balls were twice as good as the round balls; at two hundred yards thrice as good; at three hundred yards seven times better; at five hundred yards the improved ball hit nearly as often as at one hundred and fifty yards. But no round ball hit at six hundred yards, when the improved ball hit nearly a third as well as at one hundred and fifty yards distance. At seven hundred yards it hit nearly the same as at six hundred yards distance; at eight hundred yards it hit nearly one-fifth as well as at one hundred and fifty yards distance. It will be observed, therefore, from these experiments, that if one hundred and fifty men of any of these four regiments were armed with the improved gun and balle-a tige, or minie ball, that at the distance of from three hundred to six hundred yards they would in one minute do more execution than five hundred and twenty-five men at a similar distance with round balls, consequently fifteen hundred men can be made equal to five thousand two hundred and fifty men, or fifteen thousand American soldiers can now be drilled and armed to do as much execution as would have been done by fifty thousand of the veterans of the revolution.

Captain Minie lately hit a mark seven times out of ten at the immense distance of eighteen hundred yards, with sufficient force to pass through a cuirass and kill. He has likewise driven three balls in succession into a mark the size of a man's hat at a distance of three-quarters of a mile off hand, and says he can do this all day, and instruct any man of ordinary capacity to do the same.

With the common musket now in use it is necessary to teach the soldier that to hit a man at a certain number of yards off in

the middle of his body, the musket must be aimed at his chest; if at a further distance, at the shoulder; if still further, at the head; and if further still, at the top of his plume, making allowances in all these cases for the gravitating tendency of the ball after it has left the musket. But with the rifle it is different; the point of aim must be nearer the point to be hit, because the range is greater and the course straighter, but with the balle-a-tige, or minie ball, the angle of sight must be chosen precisely.

Mr. Perry has invented a breech-loading fire arm which consists in the combination of a vibratory charge-holder, working on an arbor in a socket, and moving in a circle; a magazine or tube in the breech for fifty percussion caps, a piercing cone in connection with the exploding nipple, which introduces the fire to the centre of the cartridge, producing instant explosion; also a tube forming an adjustable gas joint with the barrel, and so arranged as to be self-cleaning in the joint, which prevents any obstruction by rapid firing, all combined so as to introduce each charge separately and without breaking the cartridge, a single cap being at the same time placed upon the nipple. The charge-chamber is a little larger than the bore of the barrel, so as to prevent windage, and gives the same advantage as the minie ball does to muzzle-loaders. It can also be charged with powder and patch, and no cartridge used or desired, as the breech-chamber is loaded like a common shot-gun. It is said to possess one-third greater penetrating power, with one-sixth less powder, than any muzzle-loading gun. A ball fired from this rifle has penetrated through a target composed of eighteen pine boards, each one inch thick and an inch apart, at a distance of eighty yards.

Mr. William Palmer has invented a ball, suitable both for small guns and cannon, which he describes as far more deadly and destructive in its effects than any yet in use. He says: "It cuts, wounds, and lacerates in such a manner that it is scarcely possible that any animal or man should live after being struck by it. A ball that would fit a common gun—say five-eighths of an inch in diameter—expands on leaving the barrel to four inches, and the instant it touches anything, cuts in all directions. A cannon ball, on the same principle, would cut a space of at

least two feet. The invention has been tried in small guns, and it does not appear to affect the flight of the ball in the slightest degree.

A Mr. Neron exhibited at a recent meeting of the Institute of Civil Engineers at Paris, an ingenious mode of placing detonating caps on the nipple of a rifle or musket. The apparatus consisted of a tube containing twenty-two caps, placed parallel with, and close beside the barrel, being partially inserted in the stock, and so arranged, that whilst the near end was attached by a pin to the hammer, the further extremity was free to travel in a slot Its action was very simple, the tube being fitted with caps from a reservoir, several of which would occupy but a very small space; the end cover was turned down. On drawing the hammer to half cock, the tube was urged forward until a cap was brought over the nipple, and at full cock the cap was pressed down upon it. After firing, if any portion of the copper remained attached to the cap, it was removed by a small picker preceding the tube, on its being again drawn forward to repeat the operation.

It was evident, that by this simple and cheap addition to any fire-arm, much time must be saved in loading, and a great waste of caps avoided; they were kept dry in the reservoir, instead of being exposed to damp, and running the risk of not exploding, as had occurred frequently in action on recent occasions in the Crimea. The system was stated to have obtained the approbation of the highest military authorities in France, and with the characteristic alacrity of that government, to be already in process of adaptation to the minie rifle, and all kinds of fire-arms now used by the army. Within a very short period it has been laid before the English Institution of Civil Engineers, where it will probably meet with like success.

Martius' improved gun and cartridge is worthy of mention. It consists in a breech-bolt or slide, which, by drawing the lever forward, is brought back from the breech end of the barrel a sufficient distance to allow space in the breech in which to place a ball cartridge. When the cartridge is placed in this space or chamber through an opening on the right-hand side of the gun,

the lever is drawn back, and the ball cartridge is forced by a pressure of some fifty pounds into its seat in the barrel; the cartridge has a conical ball cemented into it.

I cannot close these remarks without mentioning Porter's patent rifle, which is one of the most recent and important improvements in fire-arms. It is a self-loading rifle, which in its construction is as sure as it is commendable.

The barrel and stock are not very different from the ordinary rifle, the invention being chiefly confined to the lock. That which composes the lock of the rifle is fastened forward with a hinge, to the band of the gun, and a spring fastens the other end of the lock to the stock. This being turned, the lock swings forward like a gate, and to it are attached all the principal appliances of the invention. Under the hammer on the lock, is a spring cap box, which constantly throws a cap over the touch-hole of the cylinder, when the hammer is raised; the gun being fired, the guard is again pressed forward, a simple metallic spring pushes away the exploded cap, and when the guard is again brought back, a new charge is under the cap ready for use.

There is an aperture at the side of the barrel about three inches in length, and three quarters of an inch in width, into which nine charges of powder and ball are placed. When they are fixed, the lock is unlatched, a new charged cylinder takes the place of the one used, and the firing is renewed. This gun has many merits over any other known. It is waterproof; all the touch-holes, nine in number, are perfectly air-tight while revolving against the lock. It will shoot forty times in a minute, is well guarded against accident, there being no cap over the touch-hole until the hammer is raised. Having brought several varieties of rifles and guns before you to night, I will at our next meeting endeavor to show that the minie expanding bullet is capable of affording greater range and greater accuracy than any other.

COMPARISON BETWEEN THE BRITISH AND RUSSIAN RIFLE.

The English rifle, now being manufactured for the troops, is very superior to the Russian, it is considerably longer, very much lighter, easier to clean and to handle, and of superior workmanship. The way in which the barrel and stock are connected is novel and ingenious.

The barrel is encircled and bound fast to the stock by three iron rings, or clips of great strength, which are kept in their place by as many spring catches, by pressing which the barrel can be unshipped immediately. The ramrod, a neatly-turned piece of steel, with cup and screw, is incomparably superior to that of the Russian rifle. The bayonet is exceedingly slight, of finely tempered steel, and the mode of securing it in its place admirable. The sight is hinged, and lies horizontally on the barrel; it is thrown up to a vertical position by a spring, and then represents a slit between two pillars, up and down which slides a small piece of metal forming the sight; the length is four feet six and a half inches, with bayonet six feet one inch; weight of rifle alone eight pounds six ounces, weight of bayonet one pound ten ounces—weight of rifle and bayonet, *nine pounds.*

The Russian rifle in length is three feet ten inches, with bayonet fixed, five feet eight inches; weight of rifle alone ten pounds, weight of bayonet one pound fourteen ounces—weight of rifle and bayonet, *eleven pounds fourteen ounces.*

The barrel of the British rifle is eight and a half inches longer than the Russian, and has three rifled grooves, whereas the Russian has only two. The British rifle, with bayonet fixed, is five inches longer than the Russian piece with its sword bayonet.

Mr. Maynard moved that the question be continued at next meeting on the first Monday of April. Carried.

Mr. Maynard gave notice that at the next meeting he will move to fix the regular meetings of this club on one day only per month, and that the third Monday in the evening.

Engineer Lemuel Serrel moved that Mr. Peel be requested to give his paper for publication. Carried.

Engineer L. M. Serrell moved that the Secretary be requested to write to the editor of the New Haven Palladium for one of the volcanic pistols. Carried.

Engineer Maynard proceeded to illustrate on the black board his views of the Minié expanding bullet and breech loading guns (the subject before the club). He called attention to the course maintained by any elongated bullet fired from a rifle in its flight, showing that when fired at an elevation it maintains the same angle until it falls to the level of the target, which it pierces at the same angle, &c. Some speak of the Minie rifle. It is the bullet and not the gun.

Mr. Hall thought that the English ball was better than the Minie—that the expansion of the ball in a uniform bore is better.

Engineer Fisher illustrated the French arm, bal-a-tige on the black board.

Mr. Maynard reminded gentlemen that the grooves in the rifle for firing Minie bullets are deepened gradually from muzzle to breech.

Mr. Streble explained the Sharp rifle, two of them being on the table for examination.

Mr. Penfield, agent of the company, was requested to explain fully the peculiar properties of that arm, which he did thoroughly, answering all questions. He remarked that the peculiar merit is in the ball, although the Sharp rifle is well made to carry it. This barrel is 21 inches in length, has an almost insensible diminution of calibre from breech to muzzle, perhaps equal to the thickness of writing paper. When a true horizontal aim is taken the ball will ascend above the point blank proportionally with that little angular difference. Our object was safety, accuracy and durability. We perfectly test every gun before delivery, and we have one of them discharged with our uniform load many times every day (it is the office of one of our men to do it), and we find the arm as good as at first, after having been fire

over *seven thousand times*. The Sharpe rifles are bushed with platina, and to prevent wear at the breech we place a steel ring within the breech which every explosion of the charge forces into close contact with the breech piece, and thus prevents any wear at that point. The breech piece is, at a slight pressure of a finger on what supplies the place of the trigger guard, lowered so as to let you look through the gun. A cartridge is put in the guard, brought to position, in doing which it cuts off the lower end of the cartridge; cock the piece, and from a short tube as large as a small quill one percussion cap alone is exactly turned off ready for the nipple. This cap is about as thick as drawing paper made of copper, one side dished, filled with the priming and covered with another piece of copper, so as to be water proof. The Sharpe rifle can be fired by one a little habituated to it, *thirty times in fifty seconds.*

The same subject was then ordered to be continued, and the club adjourned to the first Monday of April, at 7 P.M.

H. MEIGS, *Secretary.*

April 2, 1855.

Present—Messrs. Renwick, Pell, Fisher, Bell, Jos. Hall, Godwin, Barnard, Backus, E. S. Renwick, Maynard, &c.—twenty-four members in all.

Henry B. Renwick in the chair.

Henry Meigs, Secretary.

The minutes of the last meeting were read and approved.

Mr. Maynard moved that when the Club adjourns it shall be to the third Monday of April. Carried.

Mr. Fisher moved that the subject of the Minie bullet and breech-loading guns be laid on the table indefinitely. Carried.

Mr. Fisher, from the Committee on questions, recommends that those subjects be taken up at the next meeting. Carried.

Mr. Maynard described and illustrated on the black-board the flight of the conical ball.

On motion of Mr. Fisher, the Club adjourned to the third Monday of April, at half-past seven o'clock P. M.

H. MEIGS, *Secretary.*

GUNNERY—COURSE OF A PROJECTILE.

H. Meigs.

Galileo, in 1638, demonstrated that course to be parabolic, theoretically, but not so *de facto*, on account of the resistance of the air.

The force of an eighteen-pounder ball, at the greatest, is found to be 913,190 lbs. per square foot, or more than *three tons* on one square inch.

Point Blank.—The aim of the piece direct to the white spot on the target—from two to three hundred yards.

Hutton's experiments in 1784, '85 and '86, proved that bullets deviate sometimes from 200 to 400 yards from the direct line of fire.

The enormous velocity of the ball has no effect after the first two hundred or three hundred yards, owing to the prodigious resistance of the air.

Robins showed that a 24 lb. ball, aimed at a target at the distance of 474 yards, must be fired at an elevation of sixteen feet above the mark!

The Rifle.—About 1774 rifled cannon were made to carry leaden balls cast with projections on them to fit the spiral bore—that being about one turn from breech to muzzle. They were sighted by means of a sector and an achromatic telescope seven inches long, having cross hairs in it (as the micrometer has cross cobweb). This gave great accuracy in the firing.

Muskets were rifled about the same time, by cutting spiral channels in the bore, as a female screw, having a little more than one turn from breech to muzzle. A leaden ball, larger than the bore, was forced down to the charge of powder, and was both in-

dented like the male screw and elongated in this driving down. The guns were soon contrived so as to load at the breech, and the bore tapering to the muzzle, the ball became both indented and elongated, so as to preserve its true course while whirling on its axis.

Not long after that, or more than seventy years ago, some American made rifles in the Western country, and which soon bore the name of *Kain Tuck rifle*, on a better principle than those generally made since anywhere. They reasoned that their barrels were subject to change of figure by the explosion of the charge; some of them—say fowling pieces of very tough iron—would swell behind the ball like the body of a snake swallowing a toad! Kain Tuck objected to this, as being injurious to aim. He therefore made his rifle many times heavier and thicker, so that no explosion could alter its figure in the least degree. The gun was thus rendered very heavy, and required stout men to fire it off hand. The barrel was about four feet long. The ball was placed on a small leathern patch, greased with tallow, and then forced with a strong ramrod, as large as the bore of the gun. With this gun the accuracy of fire was extremely superior to that of all other guns, and the horizontal range must have been very great, but has never been registered. I saw our men firing such rifles at small pieces of shingle or board, held in the hand of one of the party; who, after each ball passed through it, held it before him, to mark the initial of the marksman on his bullet hole.

The cannon of Louis XIV, were found to be excellent; longer than necessary, however. For some time it was supposed that brass or rather a sort of bell metal was preferable to iron, for cannon. The composition was secret. The following proportions are most common, viz: for 250 lbs. they put in, copper 68 lbs., brass 52 lbs., tin 12 lbs. Experience has proved that iron is best.

The size of small arms has varied from six feet to two. Spain was first in making the best barrels. They used the nails from old horse and mule shoes, which were made of the toughest iron, and thoroughly hammered.

In 1720, the French paid Nicholas Biz, Juan Beler, and Juan Fernandez, two hundred dollars a piece for their gun barrels.

Nearly 50 years ago, a London tradesman patented a chambered breech gun. (Paixhan since.)

The rifle is said to have been invented in Germany. Those made by Kuchanrieter, senior, of Ratisbon, are most esteemed.

April 17, 1855.

Present--Messrs. Fisher, Nash, Backus, Hall, E. A. Serrell, Page, Godwin, Hon. R. S. Livingston, Edge, Connel Cowdin, Wells, and others—22 members.

The President not being present,

Mr. Backus was appointed pro tempore.

H. Meigs, Secretary.

The minutes of the last meeting, March 2, were read and affirmed. The subject of breech loading guns was considered. The chairman and Mr. J. Hall, Edward Serrell, Meigs, Godwin, Page, Prentiss and Fisher, took part in the discussion.

Isaac Edge, of Jersey, Pyrotechnist, exhibited and explained his new patent rocket, in which the fire issues from the head backwards, and also as usual from apertures at the tail. Mr. Edge claims for it great steadiness in flight and capacity to convey an inch line half a mile to wrecked vessels.

On motion of Mr. Fisher, the gun question was ordered to lay on the table indefinitely.

Mr. Serrell proposed, as a question for next meeting, "What is the best kind of iron for making horse shoes and wheel-tire for use on New-York city pavements?" Carried.

Mr. Serrell moved that Prentiss' gun be also considered at the next meeting.

Mr. Fisher moved the following subject, viz.: "Have the improvements in locomotive engines, within twenty-five years past, been such as to warrant the belief that steam power may be advantageously used on common roads." Carried.

Mr. Godwin moved that the question be advertised. Carried.

The Club adjourned to the first Monday of May next.

H. MEIGS, *Secretary.*

May 7, 1855.

Present—Messrs. E. W. Serrell, Abraham Taylor, F. K. Fisher, Henry B. Renwick, Samuel D. Backus, Messrs. Prentiss, Van Wyck, Nash, and others—21 members.

President, Henry B. Renwick in the chair.

Henry Meigs, Secretary.

The Secretary read the minutes of the last meeting.

Mr. Godwin moved to amend them in this, That the question proposed by Mr. Serrell, relative to the iron best suited for horse shoes and wheel tire on the New-York pavements, was not ordered for this meeting. After some discussion, the minutes were approved.

Mr. E. W. Serrell moved the consideration of Mr. Fisher's plan of a steam carriage on common roads, and waived the discussion of the iron shoes, &c., for the present. The next question in order, viz., Lindner's gun, was taken up.

James Prentiss, of No. 1 Chambers street, New-York, in behalf of Mr. Lindner, who was present, exhibited two of his guns; one a gun of eleven pounds weight, with an under barrel attached, in which are deposited forty cartridges of about one inch in length each. On cocking the gun (which is also a needle gun), one charge is fired and another instantly made to take its place, so that by cocking and firing, the forty bullets are all discharged if desired as fast as the piece can be cocked and fired. The other gun, called a cap gun, receives twenty-five cartridges, and is discharged and supplied like the first by mere cocking and firing. The balls are twenty to a pound. Heavier balls can be used, if desired, by elongation. Price of the 40 charge guns about $60 each.

James K. Fisher read his written history of steam carriages, including his own, and illustrated the machinery by referring to his large drawings of them.

Mr. Serrell moved that the paper be referred, according to rule, to the Committee of Arts and Sciences, for examination and publication (if approved) in the Transactions of the American Institute. Adopted unanimously.

Mr. Serrell renewed his motion (made some time ago) for scientific tests of the strength of American materials for construction. He alluded to the well known considerable difference between some foreign and our own materials in strength, and that foreign tables of strength cannot be trusted in constructions of American material of same title. The difference in favor of some American iron, for instance over foreign iron, was very gr eat

Mr. Backus remarked on the character of timber as to strength and durability, as dependent upon its place of growth, and the period of its felling.

The Secretary recalled the memory of the discussion in the Institute, and published several years ago. It was very thorough.

Mr. Fisher, from the committee on questions, moved that the question offered by Mr. Serrell, "Of the strength and durability of American material," be adopted for the next meeting;" and also, "What is the best material for the pavements of city thoroughfares." Adopted.

The club then adjourned to the third Monday of May.

H. MEIGS, *Secretary.*

AGRICULTURAL OPERATIONS OF THE UNITED STATES PATENT OFFICE.

U. S. Patent Office,
April 2, 1855.

R. L. Pell, Esq., President
of the American Institute.

Dear Sir:—Agreeably to your solicitation, herewith I furnish you with the principal facts connected with the agricultural operations of this office, and with some of the plans contemplated to be carried into effect in future. It may be interesting first to state that, prior to the time I was called to the office in June, 1853, the following sums had been appropriated by Congress for collecting agricultural statistics, &c , the idea having originated with Commissioner Ellsworth: in 1839, $1,000; in 1842, $1,000; in 1843, $2,000; in 1844, $2,000; in 1845, $3,000; in 1847, $3,000; in 1848, $3,500; in 1849, $3,500; in 1850, $4,500; in 1851, $5,500; in 1852, $5,500; in 1853, $5,000. Since that time the appropriations have been increased, those of 1854 and 1855 having been $25,000 each, besides $10,000 as a deficiency for 1853, amounting in the aggregate to $94,500 within the period of seventeen years. The cost of paper, printing, engraving and binding of the agricultural reports within that time is not included in the above named sum, and cannot therefore be ascertained, as those of the Commissioners previous to 1849 were published each year conjointly with the mechanical reports in one volume. The number of copies of the last agricultural report ordered to be printed by Congress is 108,000, which will cost about $110,000. This, together with the appropriation of $25,000 for the collection of agricultural statistics, and the procurement and distribution of cuttings and seeds, probably makes a larger

sum than is annually expended for agricultural purposes by any other government of the globe.

In the disbursement of the last three appropriations by Congress for the purposes above stated, aside from the other duties incumbent upon this Bureau, it has been the object to promote, as far as practicable, the paramount interests of the farmers and planters of this country, in the improvement and augmentation of their crops and live stock, the introduction of new and valuable products, the amelioration of the exhausted and unimproved soils of the States lying along the sea-board and the Mexican gulf, in developing the agricultural resources of those States bordering on the Pacific, the Mississippi and its tributaries, the great lakes and the Canada frontier, in order thereby to produce larger quantities and of better qualities of our chief staples for export and domestic use. In order, therefore, more effectually to carry out this object, various circulars were issued by the Commissioner of Patents and sent to important persons in this country, as well as to our diplomatic and commercial agents, missionaries, officers of the navy, and other public functionaries abroad, for the purpose of disseminating and eliciting agricultural information, and for the procurement and distribution of cuttings and seeds. Through some of these agencies a species of "reciprocal exchange" of seeds, &c., has been established, and partially carried into effect, with all the principal countries of the globe. In addition to this, the subject seemed to be of sufficient importance last autumn to justify the sending of an accredited agent to Europe, in order to make the best selection of seeds directly from the growers, as well as such new varieties and species as had recently been introduced from distant parts as would be likely to succeed in the United States. Consequently a large quantity of valuable seeds, trees, and cuttings were procured, which since have been distributed for experiment in every section of the Union. It is confidently expected by many that this measure will result greatly to the benefit of our agriculturists. Similar benefits are also hoped for from the dissemination of approved varieties of Indian corn and other seeds, produced in certain sections of the country which were not generally known in others, for instance; a valuable va-

riety of corn was obtained from New Mexico, bearing the name of "white flint," which proves to be admirably adapted to the purposes of domestic economy, as well as for feeding to stock, and which has been generally cultivated in all the States south of Massachusetts with marked success. Another esteemed sort has been procured from Iowa, known in that State by the name of "Lee" corn, which appears to be of a highly prolific character, and well suited for general use on a farm. And a third variety has been obtained from the central part of New Hampshire, known under the appellation of "Improved King Philip" corn, of almost unprecedented rapidity of growth and maturity, as well as being very productive in its yield, which has proved in numerous instances well adapted to high latitudes and elevated positions, where the seasons are too short for most other varieties of corn to grow.

Among the foreign products which have more recently been imported or introduced, and distributed for experiment, and which appeared to be susceptible of profitable cultivation in this country, I would instance the following

CEREALS AND OTHER PLANTS CULTIVATED FOR THEIR FARINACEOUS SEEDS, STRAW, OR HAULM.

Turkish flint wheat, from Mount Olympus, in Asia, a fall variety, with rather large, long, flinty berries, not very dark colored, and possessing remarkable properties for long keeping in a moist climate, or for transportation by sea, without kiln-drying. It has proved itself both hardy and prolific in the Middle States, and its culture deserves to be extended. The spikes are of good length and size, having only a light beard.

Algerian flint wheat, from the province of Oran. This variety has a remarkable large berry, rather dark colored, and weighing 70 pounds to a bushel. From a sample sown in the valley of Virginia, in November last, it yielded at the rate of 35 bushels to the acre, equal in size and weight to the original. The spikes are large, bearing an enormous beard.

Pithusian flint wheat, from the island of Ivica, another fall variety, resembling the Algerian, but having larger berries, varying in color from light to dark.

Syrian spring wheat, from the "Farm of Abraham," at the foot of Mount Carmel, in the Holy Land. The berry of this variety resembles that of the last preceding, and is reputed to have matured in sixty days after sowing.

Cape wheat, from the Cape of Good Hope, procured by Commodore Perry, of the Japan expedition. This is a beautiful light colored wheat, slightly flinty in its character, and doubtless produces an excellent flour. It probably will do much better in the South than in the North, if sown in autumn, unless it should prove to be a spring wheat. If successful, it will be liable to degenerate, unless the seed is often replenished or changed.

Spanish spring wheat, (Trigo candeal) from Alicante, a beautiful variety of unsurpassable whiteness, and is reputed to have ripened in less than ninety days after sowing. It will doubtless succeed well as a winter wheat at the South, and a March or spring variety at the North. The berry is rather long, plump, and slightly flinty in its character. The flour is of unrivalled whiteness, and is celebrated in Spain, as entering into the composition of candeal bread (pan candeal).

White Hungarian wheat, (blé blanc de Hongrie, of the French,) from the south of France. The spikes of this variety are white, of medium length, very compact and square-like, terminating abruptly or not tapering to the extremity; chaff smooth and thin, spikelets, containing four grains, which are quite large, short and plump, or rounded, white and slightly transparent. Weight 66 pounds to the bushel. It is reputed to be about a week longer in ripening than other sorts, but from its superior qualities it well deserves a trial in this country, as a fall or winter wheat at the South, and a March or spring variety at the North.

Red-chaff white wheat, from England, having a very large, short, rounded berry, generally soft, but often transparent. It is rather tender and probably would not succeed as a fall wheat, north of Virginia.

White Neapolitan wheat, (Richelle blanche de Naples) from the south of France, where it is much cultivated. The spikes are long, but not very compact; terminal spikelets, having short awns, from one-fourth of an inch to an inch in length; chaff, delicately tinged with a dull yellow or copper color; grains large, considerably elongated, and generally of a yellowish white color. It has the disadvantage of ripening late, and is believed to be too tender for the North. Possibly it may prove to be a March or spring wheat, if sown early in the Middle States, or at the South.

Girling's prolific wheat, from England, a very prolific fall variety, with a large, short, plump, brown berry, but inclined to be soft. Like the Red chaff White, it is thought to be tender and unsuited for the northern states.

White Chilian wheat, from Santiago de Chili, a beautiful variety, with large, rounded, plump, white grains, resembling those of the Red chaff white, from England, and like which, it is believed to be too tender for the north.

Saumur Spring wheat, (blé de saumur de mars,) originally from the valleys of Anjou, a south-eastern department of France, and is a very remarkable variety for fall or winter sowing. The berry is rather soft though full, of a reddish color, and much esteemed by farmers for its early maturity, which perfects itself some days before the ordinary sorts. As its name implies, it may also be sown in March, which will add to its value in this country as a spring wheat. If sown in autumn, it probably would succeed in the middle or central range of states.

Early Noé wheat, (blé de l'Ile de Noé,) introduced into the central part of France by M. de Noé, and is commonly known there under the name of *Blé bleu*. From its hardy and productive nature, it is gradually superseding the Saumur wheat in the high latitude of Paris, and is much sought after on account of its precocity. As this wheat and the preceding variety have the property of ripening some days before the common sorts, if they succeed in our climate in this respect, a great point will be gained. A single week thus gained in ripening, would often secure the crop from injury by the fly or rust, aside from the

advantages to be acquired from an early market. It would probably succeed well as a spring wheat, if sown early.

Geja wheat, from the south of Spain, with a large, moderately long, full berry, of a brown color, rather inclined to be flinty. It probably would be too tender to sow at the north as a fall wheat, although it might succeed if sown early in the spring.

Large northern prolific rye, from Germany, with a large grain, and doubtless will be suited to the middle, if not to the northern States.

Japan barley, procured by the Japan Expedition, and possesses nothing remarkable beyond its name.

Spanish barley, from the south of Spain, with a full, well-filled grain, which promises well.

Common or old Black oat, (Avoine noire de Brie,) from France. In the length of the straw, and the form of the pannicle, this variety is similar to the Potato oat. The grain is rather large, well filled, and of a shining black color, lighter towards the point. It is very prolific, and about a week earlier than the potato oat, weighing forty-two pounds to the bushel.

Chenailles oats, (Avoine noire de Chenailles,) from France, resembling the preceding in the character of the grain, but somewhat earlier, and of taller growth.

Spanish oats, from the south of Spain, with light-colored grains, heavy, and well filled with farinaceous matter. It probably would succeed well in the middle and southern states for late fall or winter sowing.

Silver buckwheat, (Sarrazin argente,) from France, an esteemed sort, with whitish grains and employed for the same purposes as the common kind.

Japan buckwheat, procured by the Japan expedition, having nothing in particular to recommend it except the name.

White Quinoa, (Chenopodium quinoa,) from France, but originally from Peru, where it is a native. The grains are round,

white, and about the size of mustard seed. The leaves of this plant, before it attains full maturity, are eaten like spinach; but the seeds are the parts most generally used as food, being both nutritious and wholesome, as well as easy of digestion. They are prepared in a variety of ways, but most frequently are boiled in milk or soups, or cooked with sweet peppers and cheese.

This plant is very vigorous, quite insensible to cold, and produces an abundance of seed on a good light warm soil. Its culture is simple. If intended for its grain, it may be sown in a sheltered border early in the spring in order that it can be transplanted before the return of summer heats, or it may be sown in open culture in drills in the middle of spring. When the plants become of sufficient size, they are removed and planted at the distance of twenty inches apart, well exposed to the sun. If desired for the leaves, only, they may be set nearer to each other, and the stalks cut off at the first gathering, in order to cause them to branch out for a succession of crops. By watering during the summer, should there not be rain, the product of leaves will be incessantly renewed.

Forty-days maize, (Mais quarantain,) a dwarf variety, from the south of Spain, reputed once to have ripened high up the Alps, in forty days after planting. The object of introducing this grain into the United States, was on account of its quick growth, early maturity, and sweet flavor in the green state, as well as the delicacy of the bread made from its meal. Besides, it appears to be well adapted to the high latitudes and elevated valleys in many parts of the country where most other varieties of corn will not thrive, and with a chance of a successful result in crossing it with the larger sorts to which it might impart, in a degree, its quality of early ripening, if not its taste.

Indian Millet, or Dourah Corn, (Holcus sorghum,) from St. Martin, in the West Indies. As its name implies, it is a native of India, and is cultivated in most parts of Asia Minor, Africa, the West Indies, and Brazil. It has also been introduced into the south of Europe, China, Cochin-China, Japan, and into the southern and middle portions of the United States. In Arabia, it is

called "Dora," or "Dourah," in France "Sorgho blanc," or "Doura," in the British West Indies "Guinea corn," in the United States "Dourah corn, and "Tennessee rice." It will grow to perfection from Pennsylvania to Texas, and doubtless would mature its seeds in most of the Western States south of Iowa. There are two distinct varieties of this corn cultivated with us, namely, the "White" and the "Reddish-brown." They are readily distinguished by the color of the seeds. The brown is preferred to the white, as it is more prolific in grain, which matures earlier and yields four times as much. The white is so late in maturing that the frost destroys much of it, and it yields so little grain, compared with the brown, that our planters have almost abandoned its culture. The meal, or flour, of the white is much lighter colored and nicer in appearance than that of the brown, the latter being dark colored by the pericarp and chaff. Both varieties grow well until checked by frost.

This plant grows well on the poorest soils, but makes the best crops on those which are light, rich, sandy loams, or rich, black lime-stone soils. The land is plowed into ridges, from three to four feet apart, just before the time of planting. In March, April and May, and sometimes in June and July, these ridges are opened with a plow, and the seed either sown and covered with a harrow from an inch to one and a half inches deep. It is also sown broadcast, and covered with a harrow. In some instances, it is planted in the missing hills of Indian corn. From a peck to a bushel of seed is sown to the acre. Plenty of seed, however, must be put in to secure a stand. If it is much weevil-eaten, and then covered too deep, it does not come up well. After it comes up, it will grow in spite of the frost, rain or drought, being a very hardy plant. When sown broadcast, it need not be worked at all. If drilled, it is chopped with hoes to a stand and plowed once, unless drilled for soiling, when it is not thinned out. If planted with Indian corn, it is cultivated with it. It needs but little culture. After it gets a start, it defies weeds and grass, and will make a crop in spite of every disaster. In the Southern states this corn will yield from 10 to 100 bushels of seed to the acre, according to the quality of the land and mode of culture.

It is sometimes cut green for soiling cattle and mules; and if properly done, so as not to injure the buds near the ground, it may be cut several times in a season. It is also cured and made into fodder, or hay. When intended for fodder, it is pulled and cured like the stalks of Indian corn. The ears are cut as they ripen, and are preserved for seed, or fed to stock. The stalks are cut after the seed ripens, in Sept. and Oct., and fed to animals. The ears are eaten entirely by cattle and hogs. The stalks are sometimes cut before frost and put into barns, and then fed to stock. They remain green for months, and do not ferment or spoil as soon as Indian corn and other grains. The planters, after gathering their seed, and curing as much as they desire of it, in September or October, turn all their stock into the fields to feed. No further care of them is necessary, except to salt and water them. If the field is large enough, in a short time all will get fat on it, and leave the ground covered from ankle to knee deep with the stalks. Besides serving as food for fowls and animals in Egypt, India and China, it is used as food by the inhabitants. A failure of this crop in Arabia would be as great a calamity as almost that of the wheat crop. It is their food and fuel, and grows by scanty irrigation on land which produces scarcely any other grain. It is ground into flour and cooked alone into cakes and bread, or mixed with rice-flour and other food. In Germany it is substituted for rice, and sells for about the same price.

Taking into consideration the facts that it will yield more stalks, fodder and grain, on a greater variety of soils, and with less labor, in any season, and returns more litter to the land than any other grain, and being a universal food for man and beast, in tropical climates, it may be justly considered one of the most valuable of the cerealia. There is a diversity of opinion whether this plant exhausts the land. As broom corn is considered as exhausting, so may this be. It decays very slowly, requiring a year to do so if allowed to remain on the surface. Turned under with the plough it decays much sooner, and, no doubt, if previously limed, it would rot much sooner, and be as valuable manure.

LEGUMES.

Early long-podded bean, from England, quite as prolific as the common long-pod, but considerably earlier. It probably will do well at the South, but of doubtful success north of Virginia.

Long-podded or butter bean, from Germany, an esteemed sort for eating in a green state, when shelled.

Early Dwarf French bean—(Haricot flageolet, or Nain hâtif de Laon) rather long, narrow, and cylindrical in shape, and of a whitish or pale green color. It is one of the most esteemed varieties in the neighborhood of Paris, very dwarfy, and rapid in its growth, and is much employed there as "snaps," or shelled in a green state, and even when dried. From its bushy or dwarfy habit it will bear close planting, say from two feet to two and a half feet apart.

Pearl bean, without strings, from Germany, a fine variety, used as "snaps" when green, or in a dried state when shelled. It probably will prove a runner.

Pearl or Round Turkey pea bean, from Germany, represented as an excellent and prolific sort, with yellow transparent pods.

Early May pea, from England, already known to the market gardeners and seedsmen of the United States.

Early White May pea, from Germany, represented as an excellent variety for early sowing.

Dwarf Hamburg Chester pea, from Germany, the best and earliest of the earliest sorts of that country.

Late Fall Golden pea, from Germany, well adapted for very late sowing for autumn use, and not affected in its growth by mildew or heat.

Capucine pea, from Germany, a fine variety to be used in succession.

Champion of England pea, from England, much esteemed as a second sowing; already well known to American seedsmen as well as to private growers.

Oregon pea, described in last year's report, the origin of which is unknown. It greatly resembles, if it is not identical with the oleaginous pea (dolichos viridis) lately introduced into France from China by M. Montigny, French cousul at Shanghai, to whom we are already indebted for the sorgho sucré and the Chinese yam.

Japan pea, also described in last year's report, and has been since cultivated with remarkable success.

Soja bean (soja hispida), procured by the Japan expedition; two varieties, the "white" and the "red-seeded," both of which are employed by the Japanese for making *soy*, a kind of black sauce, prepared with the seeds of this plant, wheat flour, salt and water. This "soy," or "soja," whhich is preferred to the *kitjap* of the Chinese, is used in almost all their dishes instead of common salt. The soy may be made as follows: take a gallon of the beans of this plant and boil them until soft, add bruised wheat one gallon; keep them in a warm place for twenty-four hours, then add common salt one gill, and water two gallons, and put the whole into a stone jar and keep it tightly closed for two or three months, frequently shaking it, and then press out the liquor for use. The seeds of this plant, to be cultivated, only require to be sown in a warm sheltered situation, at the time of planting Indian corn, and cultivated as any garden bean.

White Lupine (Lupinus albus), from the south of Spain, where it is cultivated to a limited extent for forage as well as for soiling. It was employed as food by the ancient Romans, and, as with the inhabitants of the present day, was ploughed into the soil as a manure. In Germany, also, it has been found to be one of those plants by which unfruitful sandy soils may be most speedily brought into a productive state. The superiority of this plant for the purpose of enriching the soil depends upon its deep roots, which descends more than two feet beneath the surface; upon its being little injured by drought, and not liable to be attacked by insects; upon its rapid growth, and upon its large produce in leaves and stems. Even in the north of Germany it is said to yield, in three and a half to four months, ten or twelve tons of green herbage. It grows in all soils except such as are marly

and calcareous, is especially partial to such as have a ferruginous subsoil; and besides enriching also opens stiff clays by its strong stems and roots. It abounds in potash, nitrogen and phosphoric acid, and is considered the best of green manures, being almost equal to farm-yard dung. The seeds are somewhat expensive, and about the size of peas. They should be sown as early in the spring as the season will admit, without injury from frost, and the plants will blossom in three or four months, soon after which they may be turned into the soil, and succeeded by most of our field or garden crops. Although rather slow to decay, its decomposition may be hastened, if desirable, by the addition of caustic lime.

Yellow Lupine (lupinus luteus), from Germany, where it is extensively cultivated as a green or vegetable manure to be ploughed under in poor soils. Large crops are also obtained for the seeds, which, when ground or crushed, serve to fatten cattle and swine. Its culture is nearly the same as the preceding.

Carbanzo (cicer arietinum), or chick pea, from Alicante in Spain. This is an annual plant much cultivated in the south of Europe as well as in Asia and Africa. Cooked whole it is not easy of digestion, but when eaten in the form of soup or porridge it is much esteemed. The famous Parisian dish called *purée aux croûtons* and the *olla podrida* of Spain, particularly the former, is composed of this pea. In warm countries it is sown in autumn and harvested the following summer, but in a more temperate climate it is sown in spring and gathered in autumn, just before its perfect maturity, in order that it may more readily be cooked.

Gallardon's Large Light-colorded Lentil (ervum lens), from the south of France, but much cultivated in the neighborhood of Paris both in the garden and the open field. It is usually sown in lines or hills, but seldom broadcast. It is best adapted to a dry and sandy soil, as on rich land it runs too much to stalks and leaves rather than seeds. In France it is sown late in March or the beginning of April. In order that the lentils may be of a better or finer quality, they are shelled or threshed out only as they are required for use. They may be cooked with bacon or

in the form of a porridge or soup. The ancient Romans are said to have caused them to germinate before cooking, in order to develope their saccharine qualities.

PLANTS CULTIVATED CHIEFLY FOR THEIR TUBERS OR ROOTS.

Potato seed (Solanum Tuberosum), from Germany, obtained from the apples, or balls of the potato haulm. The importance of experimenting with seed and the mode of culture are treated at length in another part of this report.

Fluke potato, from England, a superior variety much esteemed at Liverpool for its flat shape, fine qualities for domestic use, and for long keeping. It bears late planting, yields well, and has never been known to be much affected by the rot. In order fairly to test its adaptation to the middle or Northern States, it would require to be cultivated for several years.

Regent potato—the potato of London market. It is roundish in shape, of good size, having a yellowish, rough skin, dry, mealy, of excellent flavor, and light colored within. It matures rather early, keeps well during the winter and spring, and is productive in its yield.

Lapstone Kidney potato, a fancy variety lately originated in Yorkshire, England, by a shoemaker. From its slight resemblance in shape to a lapstone it has acquired its name. It is rather small, smooth, and light-colored without, and perfectly white and flour-like within when cooked.

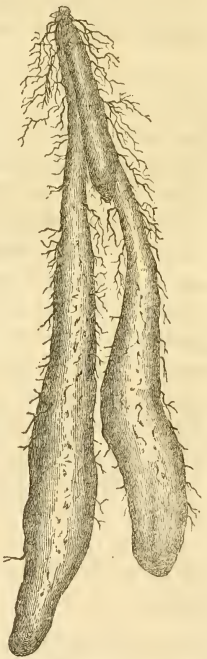
Early White potato, from England, another fancy variety, of small size, finger-shaped, and early to mature.

Chinese Yam (Dioscorea batatas), proposed as asubstitute for the common potato, and appears to be particularly worthy of a place in the kitchen garden, as well as in field culture, on account of its perfectly feculent flavor and the absence of any after-taste of sweetness, acidity, or spiciness, such as is often found in other plants; as also on account of the ease with which it can be cultivated and multiplied, and the facility of preserving it from decay. These are the important points by which, if once adopted, it must be judged; and whence its cultivation will be extended

and improved for general use, as it is believed it can be by intelligent hands.

This yam was sent from Shanghai, in China, by the French consul, M. de Montigny, some five or six years since. It is every-

where cultivated in that country, and bears the names of *Chow-Tu*, *Tchou-Tu*, *Tou-Tchou*, *Chau-Tchou*, *Chau-To*, and *Chau-Tu*, which signifies "Arum of the mountain." At Nankin it is very large, and of excellent flavor; that of the country of Chou is better still; but for medicinal purposes they prefer that of the Chou-Tu of Hoaï-King, where the root is laxative and sweet. It belongs to the family of Dioscoreæ, having annual stalks or vines, and perennial roots. The leaves, in general, are opposite, triangular-cordate, acuminated above, with round basilar lobes; having seven or eight principal nerves converging towards the top, between which is a net-work of secondary fibres crossing each other. They are about equal in length and breadth, having a smooth and glossy surface, and of a deep green color. Their petioles, or foot stalks, extend about half their length; they are strongly canaliculated, or furrowed above, and are of a violet color, which shows itself from the moment they spring forth. The flowers are diœcius, that is, the sexes growing on different plants, disposed in spiriform bunches, at the junction of the leaves. The corolla of the males is composed of six petals of a pale yellow color, the three outermost ones rounded, and the three inner smaller ones of roundish oval. The stamens, six in number, are extremely small, though well defined, and the anthers are oval, and supported by short filaments, grouped freely in the centre of the flower. As the male plant only has been introduced, the female cannot be described, and consequently no seeds produced before the latter can be procured. See engraving on page 600.



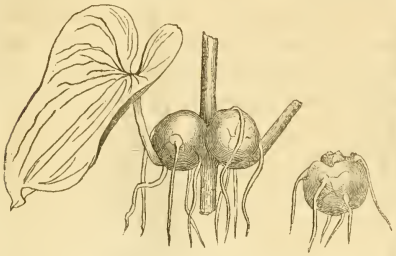
The roots, or tubers, vary in length and thickness, according to the nature of the soil, in reference to the lightness, depth, and tenacity, which, no doubt, influences their form and mode of development. The maximum size to which they grow is about

two inches, the larger end tapering upwards to the size of the finger, as indicated in the cut above. They are covered by a brownish fawn-colored skin, pierced by numerous rootlets. Under this envelope is a cellular tissue of a white opal color, very crispy, filled with starch, and a milky, mucilaginous fluid, with scarcely any ligneous fibre. In cooking, this tissue softens and dries, but to a greater degree, like that of the common potato, the taste of which it much resembles. Each plant often produces several tubers, though generally it has but one. They usually weigh about half a pound each, but sometimes three pounds, running perpendicularly into the earth, to the depth of a yard. M. Decaisne, of France, says, however, that those, cultivated by him, rarely exceed 15 to 20 inches in length.

The cultivation of this yam appears to be easy and simple. M. Decaisne, in the "Revue Horticole," for 1854, has described the method adopted in China, which is nearly as follows: In autumn they choose the smallest tubers, which they preserve from injury by frost, by covering them in a pit with earth and straw. The spring succeeding, they plant them near each other in a trench, in well prepared soil. When they have put out shoots, one or two yards in length, they cut off the joints and leaves containing the buds, and plant them for reproduction. For this purpose, they form the ground into ridges, on the top of which a shallow trench is made with the hand, or some suitable implement, in which these joints are planted, covering them slightly with fine earth, with the leaves rising just on the surface. Should it rain the same day, they shoot immediately; if not, they water them gently until they do. In fifteen or twenty days, they give birth to new tubers and stalks, the latter of which it is necessary to remove from time to time, to prevent them from taking root on the sides, and thus injure the development of the tubers already formed.

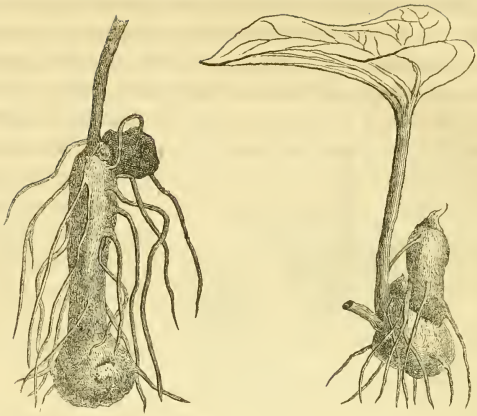
The method which had been found to answer best in France, according to "Le Bon Jardinier," for 1855, consists in cutting the tubers into fragments of moderate size, placing their crowns, or eyes, in small pots, in April, and then transplanting them into a deep, rich soil, as soon as the spring frosts are no longer to be

feared. Notwithstanding the plant has a tendency to plunge its roots into the earth perpendicularly, any distortion to which it might be liable in the pot, will not be in the least prejudicial to its future growth, as is the case with other yams. It is even thought, that its cultivation in large pots, buried under ground, might be successfully adopted in some cases, particularly where the soil is of a permeable nature, which would allow it to extend its roots, to a depth of more than a yard.



If it is desired to multiply the plant rapidly, in a high latitude, it can be done by means of suckers, or slips. To this end they may be cut in June or July, as many slips as there are sets of leaves on the vine, and plant them side by side under a glass in a light, sandy soil, sufficiently deep for the bud at the base of the leaves merely to be covered. The better way is to let the leaves remain entire, unless they are disproportionably large. In about five or six weeks, the slips will take root, and present at the angle of each leaf a small tuber about the size of a pea, as denoted in the cut above.

These scarcely increase in size during the season, but become sufficiently ripened, on ceasing to water them, to replant in the spring, when they will grow with as much vigor as if produced from the cut tubers, as shown in the figures below.



In this manner, each plant may be made to yield a hundred fold. The reproduction from the vines, however, may be brought about in more temperate latitudes, by planting them in a garden in the open air. In this case, it is better not to cut up the vines, but to bury them horizontally just below the surface, with the mid-rib of the leaves resting on the ground. Should there not be sufficient rain, the soil must be kept moist by slight waterings at the close of the day.

If we may judge by the stagnation of its vegetation during drought, this plant seems to require irrigation, or watering. The leaves and vines are small considering the size of the roots, and will probably allow of close planting, say eight or ten to the square yard. The vines in general, when not propped up, spread over the ground without taking root, intertwining with each other; but do not grow to that length as when propped up by polls or stakes. In one instance, in France, a strong pole about ten feet in height above ground was inserted near one of these plants, which wound itself regularly around it and soon overreached its top. This yam requires no cultivation other than that of eradicating the weeds, as the operation of earthing up is regarded as quite superfluous.

What may be the result of meteorological influences on this

product in different climates and seasons cannot at present be determined. In the neighborhood of Paris, last year, it made rapid progress; the long vines growing vigorously and putting forth an abundance of leaves. Towards August, many flowers of the male kind appeared, and by the middle of September the vegetation was insensibly checked, assuming a yellow tint, indicating that the period of maturity of the tubers was near at hand, which, however, were not dug before the 6th of November.

The expense of labor may be more than that of the potato, but it will be amply compensated by the prolific result. To facititate the extraction of the tubers from the earth, it is recommended that they be planted as near as practicable in bunches, or hills.

This root, it will be seen, is voluminous, rich in nutritive matter, and can be cooked in every respect like the common potato, and can even be eaten in the raw state. It also bids fair to become a source of as much profit to the cultivator; richer in fact in nutriment; it is believed to be destined to render even greater service to the world.

Earth Almond, or Chufa, (Cyperus esculentus,) from the south of Spain. This is a perennial, indigenous to the southern parts of Europe, growing in the form of a rush to the height of about three feet, producing small tubers about the size of an ordinary bean, and are known by the Valencians by the name of "chufas." The tubers resemble in taste a delicious chestnut or cocoa nut, and like them, may be eaten raw or cooked. After soaking in water twelve hours, they are eaten as a sauce. They are chiefly employed in Spain for making an orgeat, (orchata de chufas,) a delightful, refreshing drink, much used in Madrid, Valencia, Cuba, and other hot climates where it is known.

In the middle States, it may be planted in June or July, in bunches, two feet apart each way, ten or twelve tubers in each, about six inches asunder. As soon as the first shoots begin to appear, the ground should be watered, and repeated every ten days, should there be no rain. It may be cultivated at the extreme north by starting the tubers in a hot-bed and transplanting into open ground in May. No cultivation is necessary, except

carefully to eradicate the weeds. It will continue to grow until September, when it puts forth its flowers. These, however, may be pinched off, in order that the tubers may grow to a larger size, which will arrive at maturity in October, when they may be dug out of the ground and stored away. In drying, they lose about one-third of their weight.

In order to remove any prejudice which may exist in supposing that the Chufa is identical with the "Creeping cyperus," (C. repens,) or "Nut-grass," which is found growing wild on the banks of streams, in pastures, and cultivated grounds, from New-York to Florida and Louisiana, I would state that the latter differs essentially from the Chufa in its height, as well as in the size, shape, and color of its spikelets. Its roots also contain many fibrous branches, often terminating in edible tubers, about the size of a pea, creeping continually along with and just below the surface, and send up numerous suckers, which are regarded by southern planters as a great scourge to their crops. The Chufa is quite different from it in this respect, only throwing up several stalks from one root, like the common potato, but does not spread.

Considerable attention has long been devoted to the cultivation of the Chufa in the south of Spain, where, it is stated that more than $400 has been realized from an acre, in the short space of five months.

Turnips.—Through the liberality of Messrs. Charlwood and Cummins, extensive seedsmen of London, the office received the following twenty-six varieties of turnip seed, on condition that they should be sent to every State and Territory in the Union, for experiment, with the view of testing their adaptation to the soil and climate; said experiments to be conducted as uniformly as practicable, and the results made known to the public in the form of a report: Skirving's Swede or Ruta Baga, Rivers' Stubble Swede, Laing's Swede, Green-topped Swede, Dale's Hybrid, Green-topped Six-weeks, Snow Ball, Strap-leaved, Small Yellow Malta, White Globe or Norfolk White, Green Round or Norfolk Green, Green Globe or Green Norfolk, Golden Ball, Red Globe or Norfolk Red, White Tankard or Decanter, Green Tankard or Decanter, Yellow Tankard or Decanter, Red Tankard or Decanter, Green-

topped Scotch, Purple-topped Scotch, Skirving's Purple-topped Scotch, Early Stone or Stubble Stone, Yellow Stone, Red-topped Stone, White Dutch, and Yellow Dutch.

It may be needless to state that the above-named request has been complied with so far as the office is concerned, and the seeds distributed with an appropriate circular, to all parts of the United States.

There have also been imported from England, in addition to the above, the following sorts, and extensively distributed, far and wide: Rivers' Swede, Ashcroft's Swede, Sutton's Green-topped Yellow Hybrid, Sutton's Purple-topped Yellow Hybrid, Sutton's Cruicksfield Hybrid, Sutton's Early Six-weeks, Border Imperial, Orange Jelly, Yorkshire Paragon, Sutton's Imperial Green Globe, and Lincolnshire Red Globe.

Four varieties were likewise imported from France, viz: Navet long des vertus, Navet de Freneuse, Navet turnip, and Rave d'Auvergne.

Radishes.—Two varieties of radish were imported from England, the "Yellow Turnip" and the "Long Scarlet." From France there were received the "Large Field Radish," (Raifort champêtre,) "Olive-shaped Radish," (Radis rose demi-long,) "Short Scarlet Radish," (Radis rose demi-long écarlate,) and the "Winter Rose-colored Radish," (Radis rose d'hiver.)

Beets.—Of these, there were imported from England, the "London Red," and the "Bassano," the latter a turnip-rooted variety, which originated in Italy, and is already known to American cultivators. There was also introduced from France, the "Scaly or Rough Red Beet," (Betterave rouge crapaudine,) and from Germany, the "White Silesian Sugar Beet," the latter of which is particularly valuable for feeding to milch cows.

Of the *Mangold Wurzel* two sorts were imported, the "large long yellow globe" from England, and the "large long yellow" (betterave jaune grosse) from France. The former is a fine variety which originated in England, growing mostly above the surface of the ground, which renders it particularly fit for shallow

soils. The latter holds the first rank in the neighborhood of Paris for feeding milch cows. There is also the "German yellow" (betterave jaune d'allemagne), introduced into France about thirty years ago, and is now extensively cultivated. From this a sub-variety has been produced, called *betterave jaune des barres*, which some consider as a model forage beet, or mangold wurzel. It is of elliptical form, and so little buried in the ground as to be easily torn up by the hand, and equal in quantity and quality to the varieties named above.

Carrots.—Of carrots five sorts were imported, "St. James" from England, and the "short red" (carotte rouge courte), "long yellow" (carotte jaune longue), "vosges white" (carotte blanche des vosges), and the "green-crowned white" (carotte blanche á collet vert), from France.

Parsnips.—Of these only two varieties were introduced, namely, the "hollow-crowned," from England, and the round parsnip (panais rond), from France.

Onions.—From France three varieties of the onion were imported, the "Brunswick dark red" (oignon rouge foncé de Brunswick), "Cambray" (oignon de Cambrai), and the "early white" (oignon blanc hâtif).

A variety of leek (poireau long) was also imported from France.

The Celeriac, or Turnip-rooted Celery (apium graveolens rapaceum), has been introduced both from Germany and England. The root of this plant, when properly cultivated, is tender and marrow-like, having a sweeter taste and stronger odor than those of other celery. It is principally used for seasoning meats and entering into the composition of soups. The soil in which it is cultivated should be deep, rich and well worked. The seed may be sown at the flowering of our orchard fruits, in drills six inches apart, kept regularly watered every evening, should the weather prove dry. The bed must be kept free from weeds, and when the plants are about three inches high they may be pricked out in rows three inches apart each way, giving abundant and frequent waterings. By adopting the precautions mentioned in the culti-

vation of celery, the same seed-bed will afford two or three distinct prickings. When the plants are five or six inches high they are fit for removal to level ground, where they are to remain, and in drills two feet asunder and eight inches apart along the drills. The only after-culture required is to earth them up to a height of about three inches, watering them plentifully at least every other evening, if the weather be dry, and keep them free from weeds.

Chickory, or Succory, (chicorée sauvage à café,) from France, principally cultivated for use in salads, and for its roots to roast for mixing with coffee. Like endive, for the main crop, it requires a rich light soil; and for earlier sowings a moister one, having in every instance an open situation. Although a perennial, it must be sown annually, as after being cut from two to three times the leaves become bitter and worthless. The periods of sowing may correspond with those of the flowering of our orchard fruits. Sow moderately thick, in the same manner as endive. When the plants begin to cover the ground, thin to nine inches apart, and those removed plant out at similar distances. If the leaves grow very luxuriant and shade the roots much, they must be cut off within an inch of the ground. In about four months after the sowing let the leaves of the plant be trimmed away so as not to injure their hearts, and then cover over thick with long litter, ashes or sand. By this treatment those fresh leaves which are produced become blanched and crisp, and lose their bitterness. Water must be given moderately in dry weather during the season. If the roots are vigorous they will bear cutting two or three times, after which they are unproductive.

A variety, which the French call *chicorée sauvage à café*, has long fleshy roots like the white carrot which are used for making coffee. In the middle and southern States the roots may remain in the ground during winter without injury from frost.

PLANTS, THE LEAVES OF WHICH ARE CHIEFLY USED FOR SALADS, POTAGE, ETC.

Early York cabbage, from England, already known to American cultivators.

Large Ox-heart cabbage (choucœur de bœuf gros), from France, one of the best kinds cultivated.

Alsacian, or Quintal cabbage (chou d'alsace ou quintal), from France, with short thick stalks, and very large heads, having festooned leaves of a very bright green color. The head of this cabbage grows to an enormous size on rich new land.

Large Red cabbage (chou rouge gros), from France.

Milan Salutary cabbage (Chou-Milan des vertus), from France, the largest of the Milan varieties, which are noted for growing more open, and in being more delicate and less musky in their flavor. It requires a very rich soil.

London cauliflower, from England, a superior variety.

Medium cauliflower (Chou-fleur-demi-dur), from France, possessing qualities between the fine tender sorts and those which are coarse and tough.

Broccoli.—There have been imported from England three varieties of Broccoli, the "Mammoth," "Imperial White," and the "Purple Cape," the latter direct from the Cape of Good Hope.

Two varieties of *Kohl-rabi*, or "Turnip-stemmed cabbage," one from England and the other from France have been introduced. The plant rises in a thick stem about eight inches out of the ground, terminating at the top into a globular form, somewhat like a large Swedish turnip, crowned with leaves slightly scolloped on their edges, undulated, and of a milk-green color. There are several varieties of it, but the "green-stemmed" and the "purple-stemmed," especially the latter, are to be preferred. This vegetable is sweeter, more nutritious, and more solid than either the cabbage or white turnip; produces a greater weight per acre than the latter, and prefers a heavier soil than that root; it also is hardier, and keeps better than any other bulb, and imparts, when fed to cows but little of that flavor known as "turnipy," either to butter or milk. The seed of this plant may be sown at the same period as the Swedish or ruta-baga turnip, and

may be cultivated in the same way, remembering to leave the chief part of the stems uncovered by the earth. The bulbs may be kept sound and nutritious until very late in the spring, even later than those of the Swedes.

Brussels Sprouts (Chou de Bruxelles), from France. This is a variety of cabbage, but is little cultivated in this country. It rises two or three feet high, and produces, from the sides of the stalk numerous little sprouts resembling cabbage heads one or two inches in diameter. The leaves, which look like the Savoy, should be broken down in the fall to give the little heads room to grow. They are used for fall and winter greens, and being quite hardy, should be sown and treated like Scotch kale.

Sea Kale (Crambe maritima), from England, a hardy perennial, cultivated for its blanched shoots, which are cooked like asparagus, and is esteemed as a delicate and wholesome vegetable. The seeds are sown early in the spring, about an inch deep in fourteen inch drills. When the plants are a year old they are transplanted in straight rows, five feet apart and eighteen inches asunder along the rows. It is necessary that the ground should be thoroughly trenched and manured. Late in the fall, when the leaves have separated themselves from the crown, heap over each plant a shovelful of clean sand or ashes, and earth up a ridge a foot and a half high over the rows, from a trench dug along the space between them, and beat it smooth with the back of the spade. In the spring, after the cutting is over, the earth should be leveled into the trenches, so as to expose the crowns of the plants, and a good coat of strong manure dug in around them. It is adapted to the coldest climates, and deserves to be more extensively cultivated.

Lettuces.—Of lettuce, three varieties were received from Germany, the "Blood Red," "Spotted," or Tiger," and the "Asparagus lettuce." There were three kinds also from France, the "large brown slow-growing" (Laitue grosse brune paresseuse), with greyish green leaves, marked with pale brownish spots, having very large and regular heads, slightly tinged with red at the top; "Roman pale-colored marsh" (Laitue Romaine blonde

maraîchère), an esteemed sort, much cultivated in the neighborhood of Paris, forming heads without tying; and the "Gotte" or "Gau" lettuce (Laitue gotte), a variety suitable for growing under glass for winter use.

Celery.—Of celery there was imported from France one variety, "Early Dwarf" (Celeri court hâtif), which, from its compactness of growth, does not require to be tied before earthing up, with fine dense heads and prompt in blanching. Two varieties also were imported from England, "Seymour's White Solid" and "Coles Red," both of which are already known to American growers.

True Giant asparagus, from England.

Lettuce leaved spinach (Epinard à feuille de laitue), from France, with very large, thick, dark-green leaves, which form themselves into a bunch or head.

PLANTS CULTIVATED FOR THEIR BERRIES OR FLESHY FRUITS.

Large yellow fleshed Pumpkin or *Squash* (Potiron jaune gros), from France, the fruit of which is very heavy, of a gold yellow within, and grows to an enormous size.

Cassabar Melon, from Asia Minor, which, when pure, is of a sweet, delicious flavor, and may be eaten even by invalids, with impunity. These seeds were reported to be seven years old.

Valencia Melon, (Melon de Valencia,) from the South of Spain, a variety of the Canteleup tribe, celebrated for its delicious sweet flavor, and preferred to all other varieties in the countries where it is grown.

Summer Green-fleshed Melon, (Melon d'été á chair verte,) from France.

Honfleur Melon, (Lucrin de Honfleur,) from France, very large, somewhat long, with thick ribs, having a flesh rather coarse, but full of sweet juice.

Prescott Canteleup (Cantaloup Prescott,) from France, a variety much cultivated, and the most esteemed of any at Paris. Its

color varies from green to a silvery tint, having ribs more or less rough.

White-fleshed Winter Melon, (Melon de invierno con carna blanca,) from the south of Spain.

Winter Melon, (Melon d'hiver,) from the south of France, with a smooth rind, greenish-white brittle flesh, juicy, and of a delicate flavor. It keeps well as late as the month of February.

Long, Thick, Smooth Cucumber, from Germany, suitable for salting when nearly turning yellow, after extracting the seeds.

London Short Prickly Cucumber, from England.

Long White Cucumber, (Concombre blanc long,) from France.

Gherkin Cucumber, (Concombre à cornichon,) from France, producing small green fruits, much prized for pickling.

Long Violet-colored Egg-plant, (Aubergine violette longue,) from France, a small, long-fruited variety, of much better flavor and delicacy than the large oval or round sorts.

Early Red Tomato, (Tomate hâtive,) from France.

Sweet Pepper, (Pimento dulce,) from the south of Spain.

PLANTS CULTIVATED FOR FODDER, MANURE, OR FOR THEIR USES IN MANUFACTURES AND THE ARTS.

Sorgho Sucré, (Sorghum saccharatum?) a new gramineous plant, from France, which seems to be destined to take an important position among our economical products. The seeds were sent home some four years since from the north of China, by M. de Montigny, consul of France, at Shanghai. From the cursory examination of a small field of it growing at Verrieres, in autumn last, I was led to infer that, from the peculiarity of the climate where it grew, and its resemblance in appearance and habit to Indian corn, it would flourish in any region where that plant would thrive. But how far it will subserve the purposes in this country ascribed to it in France, can only be determined by extended experiments.

The sorgho sucré is a plant which, on rich land, grows to a height of from two to three or more yards. Its stems are straight and smooth, having leaves somewhat flexuous and falling over, greatly resembling Indian corn in appearance, but is more elegant in form. It is generally cultivated in hills containing eight or ten stalks each, which bear at their tops a conical panicle of dense flowers, green at first, but changing into violet shades, and finally into dark purple at maturity. In France, it is an annual, where its cultivation and period of growth correspond with those of Indian corn; but from observations made by M. Vilmorin, it is conjectured that, from the vigor and fullness of the lower part of the stalks, in autumn, by protecting them during the winter, they would produce new plants the following spring. If cultivated in our southern states, it is probable that the roots would send forth new shoots in spring, without protection, in the same manner as its supposed congener, the Dourah corn. In the middle sections of the Union, two crops of forage might be taken from the same roots in a season, say the first of August and early in October. At the extreme north, the maturity of the seed probably would be more certain if planted in some sheltered situation; but if the object of cultivating for the extracting of sugar, or for fodder for animals, an open culture would be sufficient where the soil is rich, light, and somewhat warm. According to the experiments of M. Ponsart, the seeds vegetate better when but slightly covered with earth. M. Ledocte proposes to associate with the plant another of more rapid growth, such as lettuce or rape, in order that the laborers may distinguish the young sorgho from grass, which it greatly resembles in the early stage of its growth. Any suckers, or superfluous shoots, which may spring up in the course of the season, should be removed.

The great object sought in France in the cultivation of this plant, is the juice contained in its stalks, which furnishes three important products, namely, sugar, which is identical with that of cane, alcohol, and a fermented drink analogous to cider. This juice, when obtained with care and in small quantities, by depriving the stalk of its outer coating or woody fibre and bark, is nearly colorless and consists merely of sugar and water. Its density varies from 1,050 to 1,075, and the proportion of sugar

contained in it from 10 to 16 per cent, a third part of which is sometimes uncrystallizable. To this quantity of uncrystallizable sugar, this juice owes its facility of readily fermenting, and consequently the large amount of alcohol it produces, compared with the saccharine matter, observed directly by saccharometer. In so far as the manufacture of sugar is concerned, this plant appears to have but little chance of success in a northern climate, as a large proportion of that which is uncrystallizable is not only a loss in the manufacture, but an obstacle to the extraction of what is crystallizable. It must not be understood, however, that the produce of this plant is unprolific or difficult to obtain, but that all things being equal, its nature renders it more abundant in alcohol than in sugar. Yet it would be very different in the warmer climate at the south, where sugar cane is difficult to be obtained, in requiring protection from frost. From experiments made by M. Vilmorin on some dried stalks of sorgho sent from Algeria, it proved that the product of sugar obtained from them was infinitely superior to that produced by the same plant which had been cultivated near Paris. I was also informed by Mr. Wray, who experimented upon the juice at Natal, that the proportion of crystallizable sugar quite predominates where the climate allows the plant fully to mature.

The chief advantage of the sorgho, as a sugar plant, is the facility of its cultivation and the easy treatment of the juice. It is thought that the rough product may surpass that of the sugar-cane in those countries where the latter is an annual, and like which, its stalks and leaves will furnish an abundance of nutritious forage for sustaining and fattening animals. As the molasses, too, is identical with that manufactured from the cane, it may be used in the distillation of rum, alcohol, and the liquor called "tafia," which resembles brandy. The greatest difficulty to be apprehended, probably, would be the preservation of the stalks from fermenting, owing to the short time left to the manufacture. This, however, might be obviated, as Mr. Wray informed me that, in the neighborhood of Natal, the Zoulous-Caffers preserved it for a long time by burying the stalks in the ground, notwithstanding the climate of their country is very warm and damp. It will also be observed that in the manufactnre of brandy or al-

cohol, the uncrystallizable sugar can be turned to account, which in a measure, would otherwise be lost. Another advantage consists in the pureness of the juice, which, when thus converted, from the superiority of its quality, can immediately be brought into consumption and use. The alcohol produced by only one distillation is nearly destitute of foreign flavor, having an agreeable taste, somewhat resembling noyau, being much less ardent, or fiery, than rum.

One of the points M. Vilmorin was desirous of establishing was, at what period of the growth the stalks began to contain sugar, and consequently, when its manufacture should commence. He came to the conclusion that it coincided with the putting forth of the spikes; but the proportion of sugar in the stalk continued to increase until the seeds were in a milky state. In the plant in flower, he observed that the amount of sugar diminished in the mérithalles (parts of the stalks between the nodes, or joints,) the nearer they were to the top; and also, that the lower part of each mérithalle contained less saccharine matter than the upper. In consequence of this, and owing to the smallness and hardness of the lower knots, the centre of the stalk is the richest portion. He was inclined to the opinion that, at a later period, the mérithalles lower down the stalk are impoverished in the amount, if not in the quality, of the sugar they contain.

The ripeness of the seeds does not appear much to lessen the production of sugar, al least in the climate near Paris, but in other countries where it matures when the weather is still warm, the effect may be different. According to the report of M. de Beauregard, addressed to the "Comice de Toulon," the ripening of the sorgho in that latitude had no unfavorable effect, and he considers the seeds and the sugar as two products to be conjointly obtained. On the other hand, Mr. Wray says that the Zoulous Caffers are in the habit of pulling off the panicles of the plant the moment they appear, in order to augment the quantity of saccharine matter in the stalks. This question may be of some importance in our southern States, should this plant supercede in any manner the sugar cane.

Moha de Hongrie (Panicum Germanicum), from France, an annual, good for forage, green or dry, very productive, of quick growth, and flourishes well on dry soils. The seed may be sown from May until July. The following extract from the "Bon Jardinier" for 1855, will give some idea how this grass is appreciated in France:

"My first attempts on a large scale did not succeed well, but one of my neighbors, among others, made such good use of it for feeding horses and cows, that I was induced to try it again, which I did with success. I sowed it in 1835, in a dry, calcareous soil, when I remarked in it the quality of great resistance to drought. It remained green, and in an excellent state in spite of the high temperature and great drought of that year, even in places that had not been manured. This time I would sow it in drills, and regularly weeded it; but haricot beans and Panicum Italicum, sowed and treated in the same manner, withered and lost their leaves, whilst the moha remained green and fresh. The disastrous drought of 1842 gave new proof of the superiority of this plant in this respect. In the middle of a calcareous plane, where everything had perished, the moha remained unchanged. A considerable portion of the heads were tolerably well filled with seed, and the threshing gave a good though diminished product. When it is intended to perfect the grain, the moha must be sown in May; when it is only wanted as a green forage it may be sown as late as July, at the rate of ten to twelve pounds to the acre in the first case, and fourteen to sixteen in the latter."

Sainfoin (hedysarum onobrychis), two varieties from France, the "common" (sainfoin ordinaire), and the "double bearing" (sainfoin à deux coupes) both of which are perennial. The former is best adapted for poor soils, and will not admit of but one crop in a season. The latter is generally cultivated in all parts of France, is more vigorous, hardier, and more productive than the common sort, yielding two cuttings in a year. The farmers consider it necessary to sow it upon good land, lest the plants should deteriorate, as on soils of inferior quality the sowings must be occasionally renewed. As its stalks are thicker and harder, and its seeds larger than those of the other variety, it

must be sown more closely, say at the rate of six or seven bushels to an acre. The sowing is generally done in spring, sometimes early in autumn. If the seed is a year old it is not liable to vegetate.

Serradilla (ornithopus sativus), an annual from Germany, employed in Portugal as an artificial forage in dry sandy soils, where it affords an early pasturage for cattle. As it is somewhat tender, it probably would only answer for our southern, or, perhaps, the middle States. From its fine quality and great productiveness it is desirable to experiment with as far north as it would be likely to grow, when it would be better to sow it in spring with other grain, in order to obtain in autumn a green crop, or cut it for hay.

Heracleum Sibiricum (Berce de Sibérie), a perennial from Germany, producing a very abundant early green forage. It is sown in autumn and comes up the following spring.

Chilian Clover, or Alfalfa (medicago sativa), from Chili, a perennial variety of lucerne, which succeeds well in our middle and southern States. It differs from the common lucerne of Europe only in the color of its flowers, which are purple. It is sown in autumn in drills in a deep rich soil, producing good forage for animals, either green or dry, the following summer, and will endure for many years. Deep culture is absolutely necessary, in order to allow the extension of the roots into the earth.

Yellow or Black Trefoil (medicago lupulina), a biennial from England, at present considerably cultivated in the central parts of France. One of its advantages is, that it grows well in dry and inferior soils. Its forage, though less abundant than other trefoils or clovers, is of fine and good quality, and not dangerous to cattle when eaten green, in producing hoven. It is much more valuable, however, for an early sheep pasture than to convert it into hay. It may be sown in March or April like spring grains.

Cow Grass, or Perennial clover (trifolium medium *vel* perenne), from England, usually sown among other grass seeds for a permanency, but not with the common red clover.

Alsyke or Swedish clover, (Trifolium hybridum) from England, believed to have originated in the south of Sweden, where it is particularly abundant. It is best adapted to moist and strong soils, and has the property of self sowing, when the flowers are left to mature, which will cause it to endure for fifteen, twenty, or more years. The usual course to pursue, is to cut it once a year for hay, afterwards leaving it for pasturage. Its flowers, which put forth in June, in great profusion, resemble in shape those of the common white clover, but are larger and of a rosy tint, of a sweet, agreeable odor, and afford an excellent forage for bees. It may be sown with autumn or spring grain; with the latter it is preferable, to prevent winter killing.

Suckling Red clover, (Trifolium filiforme,) from England.

Perennial Ray grass, (Solium perenne,) two varieties, from England, the "Italian" and the "Improved." The former is said to be distinguished from the common Ray-grass of England, by its earlier maturity, larger leaves, deeper green color, and by the greater height to which it grows. It is usually sown in autumn, as is the general practice with grass seeds in the south of Europe. After the field is harrowed, it is sown, at the rate of from sixteen to eighteen pounds to the acre, and the seed rolled in. In the following autumn, the turf is covered like an old meadow, and the crop of the next year is more than double. It may also be sown in spring. It is eaten greedily by cattle, whether green or dry, and yields fifty per cent of hay.

The "Improved Ray grass" possesses several desirable properties, which recommends itself to the attention of cultivators, the principal of which are, its adaptation to a great variety of soils; the facility with which it is propagated, by reason of its seeds being produced in abundance, and their uniformity in ripening, and, the fibrous structure of its roots, which fit it in an eminent degree for alternate husbandry. Notwithstanding all these good qualities, its culture in the middle and southern portions of the Union, at least, should be entered into with caution, from the great heats and summer droughts. Again, at the extreme north, there is danger from the winter frost.

Meadow Fescue, (Festuca pratensis,) from England ; an excellent perennial grass, either for alternate husbandry or permanent pasture, but more particularly the latter. It is relished well by cattle, horses, and sheep.

Sheep Fescue, (Festuca ovina,) from England, an admirable perennial grass, well adapted for growing on elevated sheep pastures, where it is well relished by these animals, which prefer it to all other herbage where it exists.

Rough-stalked Meadow grass, (Poa trivialis,) a valuable perennial grass, from England, suitable for mixed pastures, particularly on damp soils, and where partly shaded by trees.

Sweet-scented Vernal Grass, (Anthoxanthum odoratum,) a perennial grass, from England and France, yielding but a scanty herbage, and is not particularly relished by any kind of stock, perhaps with the exception of sheep. It is remarkable for giving out a pleasant odor during the process of drying. It has been recommended to be sown in sheep pastures for the purpose of improving the mutton, a quality which it is said to possess, and which is founded on the fact that places in which it naturally abounds are said to produce the finest mutton. From its dwarfy growth, and the close sward it forms, it is recommended to be sown on lawns or ornamental grounds.

Burnet Grass, or Pimprenelle, (Poterium sanguisorba,) an annual from France, well suited for pasturage on poor dry soils, whether sandy or calcareous. It may be sown early in the spring.

Goldbackia Torulosa, a new perennial oil plant from Germany, producing an abundance of seed, suitable for making oil. It is said to be hardy, and affords an early pasturage for sheep.

Gold of Pleasure, or *Camelina Sativa* (Miagrum sativum), an annual from France, which produces a finer oil for burning than rape, having a brighter flame, less smoke, and scarcely any smell. It succeeds well on light, shallow, dry soils, and in our middle and Southern States, it probably would produce two crops in a season. Besides the use of the seeds for oil, the stems yield a

coarse fibre for making sacks and a coarse kind of packing paper, and the whole plant may be employed for thatching. The culture is similar to that of flax.

Colza or *Rape* (Brassica campestris oleifera), two varieties from France, the "Colza froid" and "Colza parapluie" The former is highly recommended, the yield being much greater than the common varieties of rape. It may be distinguished by its luxuriant growth and reddish seeds. The latter, principally cultivated in Normandy, though less productive, has the advantage of throwing out lateral branches, which, falling towards the ground, support the plant and prevent it from lodging in consequence of heavy rains, that may happen near the time of maturity. Both varieties may be sown from the middle of July till the end of August, and treated in every respect like other winter rape.

Spurry (Spergula arvensis), an annual from Germany and France, where it is much cultivated as a winter pasture for cattle and sheep. Mutton, as also the milk and butter of cows, fed with it, are stated by Thaër to be of very superior quality. It is usually sown on stubble fields after the grain crops have been removed.

But the principal use to which this plant can be applied in this country is as a green manure, on poor, dry, sandy, or worn-out soils. It may be sown either in autumn, on the wheat stubble, or after early potatoes, and ploughed under in spring, preparatory to the annual crop, or it may be used to replace the naked fallow, which is often hurtful to lands of so light a character. In the latter case the first sowing may take place in March, the second in May, and the third in July, each crop being ploughed in to the depth of three or four inches, and the new seed then sown and harrowed. When the third crop is ploughed in the land is ready for a crop of winter grain.

Sand or Seaside Lyme-grass, (Elymus arenarius), a perennial, from Holland. This grass is not eaten by any of our domestic animals, owing, no doubt, to its excessive hardness and coarseness. Sir Humphrey Davy found, by analyzing the soluble matter afforded by this plant, that it contained one-third of its weight in su-

gar. Hence it has been called the "sugar-cane of Great Britain." It has been recommended, however, that the hay made from it be cut like chaff and given to cattle, either alone or mixed with other food.

The purpose for which this plant is generally employed, and for which its creeping matted roots fit it in an eminent degree, is for binding or consolidating loose sands, when sown with the Arundo arenaria, to prevent the encroachment of the sea.

Sea Reed (Arundo arenaria), from Holland. This plant, like the preceding, is unworthy of cultivation as food for cattle, but can only be employed to advantage in raising a barrier against the encroachment of the ocean.

The object of importing the seeds of these grasses was to sow them on such parts of our coasts as may be threatened, or are suffering injury from the sea, particularly on beaches or sand hills, which are liable to changes from abrasion or drifting winds. The world renowned dykes of Holland owe much of their strength and durability to the protection afforded by these remarkable plants. With regard to their culture I have no definite knowledge.

TREES AND SHRUBS.

The Carob Tree, or St. John's Bread (Seratonia siliqua).—Of all the seeds imported for the purpose of distribution there is not one more interesting or more valuable than those of the carob tree. The pods, when matured, contain a few drops of a substance resembling honey. The tree is unquestionably of eastern origin, and it is supposed to be identical with that upon which St. John fed while in the wilderness. The seeds were procured for the office from Alicante, in Spain. In Murcia, Valentia, Catalonia, and other provinces in that country, it abounds, and frequently forms, with the olive and other valuable trees, large forests. It was, without doubt, introduced there by the Moors, who knew its nutritive qualities as a food for their horses, mules, and cattle. They probably brought it from Palestine and Egypt, whence it appears to have originated. In these Spanish provinces it now grows naturally in every kind of ground, not ex-

cepting the driest and most barren spots, where the underlying rock shows itself more frequently than earth. Its roots, twisting in every direction, accommodate themselves to the lightness or depth of the soil, while the trunk, remarkable for its smooth and light-colored bark, attains, in sheltered positions, a colossal size. The branches, furnished with greyish colored leaves, spread majestically around the trunk, and when loaded with fruit, hang down quite to the ground in the form of a tent. The fruit ripens rapidly, and such is its abundance and weight that it is necessary at once to gather it. The pods are sweet and rich in sugar, and animals feed on them with avidity, and become quite fat and in good condition for work.

There are several varieties of the tree. The produce is necessarily in proportion to the attention given. It blooms twice a year—about the first of February, and the middle of September, and when well watered arrives at a considerable height, and sometimes covers a space of one hundred feet in diameter, bearing upwards of a ton of pods. It will doubtless succeed in the southern and perhaps in the middle States.

The Olive (Olea europœa.) Of the olive, it has been said with much truth: "Olea prima omnium arborum est;" and when we consider its productiveness, longevity, and usefulness, a little enthusiasm on the subject, perhaps, would not be altogether misplaced. The present importation is by no means the first attempt to cultivate this tree in this country, as it had already been introduced into California by the Jesuits one hundred and fifty years before. In about the year 1755, also, Mr. Henry Laurens, of Charleston, imported from remote parts of the globe, a great variety of useful and ornamental productions, among which were olives, capers, limes, ginger, Guinea-grass, the Alpine strawberry, (which bore fruit nine months in the year,) red raspberry, and blue grapes; also, directly from the south of France, apples, pears, plums of choice varieties, and the white Chasselas grape, the latter of which bore abundantly. The fruit raised from the olive tree was prepared and pickled, equal to those imported.

In 1769, the olive was introduced into Florida, by a colony of Greeks and Minorcans, brought over by one Dr. Turnbull, an Englishman, who founded a settlement called "New Smyrna."

In 1785, also, a society was incorporated in South Carolina for the promotion of agriculture. The object was to institute a farm for agricultural experiments, to import and distribute foreign productions suitable to the climate of Charleston, and to direct the attention of agriculturists of the State to economical objects, as well as to reward those persons who should improve the art of husbandry. Among other objects of interest, the society imported and distributed some cuttings of vines and olives. The latter answered well, but the climate near Charleston proved too moist for the grapes. Attempts have been made to propagate the olive from seeds in various parts of the south, but hitherto with little success. This may be attributed to a tendency in the olive to sport into inferior varieties when so planted ; but there is every reason to hope that the new importations of cuttings of approved kinds will increase the production in many parts of the South.

Congress in the year 1817, granted four townships of land, in the present state of Alabama, on a long credit, to a company of French emigrants, for the purpose and on the condition of their introducing and cultivating the olive and the grape ; but the enterprise never was prosecuted to any considerable extent, and it finally fell through, and the lands reverted to the Government.

Of the olive stocks and cuttings recently from France, the following varieties were received and distributed in the Carolinas, Georgia, and other states bordering on the Mexican Gulf ; Oliver blanquet nain ; Oliver vemillion nain ; O. picholine nain, (this variety yields the kind of olives most celebrated for pickling, and is not very particular in the choice of soil and climate ;) O. verdal nain; O. de cruan nain; O. de salon (a variety producing a small round fruit, good for oil, and prefers dry elevated ground ;) O. bouquetier nain ; O. gros redonaon ; and O. violet.

The Fig (Ficus carica.) The fruit of this tree is a great and wholesome luxury, both in a green and in a dried state, and its multiplication in our southern and southwestern states cannot fail

to be fraught with great advantages. It will grow well upon the poorer and drier soils, provided it is sheltered, and can be propagated with great ease; and such is the goodness and abundance of its fruit, and the number of its varieties that in some parts of Southern Europe, it goes by the name of the "Providence of the poor." In Spain, it grows side by side with the carob and almond trees, and lines the fields and vineyards; its deep green boughs forming an agreeable shelter from the heat of the sun.

The nature of the soil and its aspect influence considerably the choice and cultivation of the different kinds of figs. The white varieties, for instance, seem to prefer an elevated position and a strong, light soil; while the darker kinds succeed best where the situation is sheltered and low. A very choice sort, the fruit of which is of a deep rose-color, while the trunk of the tree is nearly black, seems to thrive best in low shady places, provided it be exposed to the rays of the rising sun. It is possible to increase the varieties of the fig *ad infinitum*, either by seed or by the more common method of cuttings, inclined and buried from two to three feet in the earth. In the third year the young tree is pruned, and the head is formed by leaving three branches, which in due time are covered with fruit. Some cultivators graft them in various ways about the time when the sap begins to move. With due attention the product is greatly improved and increased, although few fruit trees perhaps bear so abundantly, considering the little trouble taken with them.

In all countries, which may properly be called "fig climates," two crops are produced in a year. The first is from the old wood, and corresponds with the crops of England and the middle portions of the United States; and the second from the wood of the current year, the figs produced by which, in the last named countries, are never ripened except in hot-houses. In Greece, Syria, and Egypt, a third crop is sometimes produced. The first crop is ripened, in the south of France and in Italy, in May; and the second crop in September. Those which are to be dried, are left on the tree till they are dead ripe, which is known by a drop of sweet liquid that appears hanging from the eye. The figs, being gathered, are placed on wicker hurdles, in a dry, airy shed; and,

when the dew is off, they are exposed every morning to the sun, during the hottest part of the day. To facilitate the progress of drying, the figs are occasionally flattened with the hand ; and in moist, dull weather, they are placed in rooms warmed by stoves. When they are thoroughly dried, they are packed in rush baskets, or in boxes, in layers, alternately with long straw and laurel leaves, and in this state they are sold to merchants. In some parts of the south of France, figs are prepared by dipping them in hot lye, made from the ashes of the fig-tree, and then dried ; the use of the lye being to harden their skins.

The only variety of cuttings, lately imported from France, was the large "white fig," (Figuier blanc,) which is sufficiently hardy with slight protection to withstand the climate of the middle States.

The Prune (prunus domestica).—The scions of two varieties of prunes, "Prunier d'Agen" and "Prunier Sainte Catherine," have been imported from France and distributed principally in the States north of Pennsylvania, and certain districts bordering on the range of the Alleghany mountains, in order to be engrafted upon the common plums. These regions were made choice of in consequence of their being freer from the ravages of the curculio, which is so destructive to the plum tree in other parts as often to cut off the entire crop. It has been estimated that the State of Maine alone, where this insect is rarely seen, is capable of raising dried prunes sufficient to supply the wants of the whole Union.

The *Prune d'Agen*, which is considered the best for drying, is of good size, of a violet color, with a deep yellow flesh of a delicious flavor. This variety succeeds best when engrafted upon a wild stock, or when it springs up directly from the root.

The *Prune Sainte Catherine*, in the climate near Paris, is also esteemed as excellext for drying. It likewise furnishes to commerce the well-known "Pruneaux de Tours." The tree is of medium size, about twenty-five feet high, and grows well both as a pyramid and a standard. The branches are long, slender, and but little ramified, their shape being rather slender. Through-

out their whole length there grow a large number of buds, so near to each other that on a branch a yard long there are often produced from fifty to sixty plums, hence it is easy to conceive the excessive abundance of the crop of a tree thus laden with fruit, the productiveness of which is not equalled by any other kind. This plum is of medium size, obovate, or nearly round, divided by a deep suture throughout its length. The stem is slender, about three-fourths of an inch long, curved at its upper part, and inserted in a small cavity. The skin is fine pale yellow, sometimes tinted with red on the sunny side, and lightly covered with a white transparent bloom. The flesh is yellowish, sometimes firm and adhering to the stone, very juicy, sweet, and agreeably flavored. It ripens in the neighborhood of Paris in September and October. This plum, beyond its unrivaled merit for preserving in a dried state, has the advantage of being an excellent desert fruit when fully mature.

In very warm dry climates prunes are prepared by drying on hurdles by solar heat alone; but in France they place the plums upon round wicker baskets, about two feet in diameter, and two inches deep, putting into an oven heated sufficiently warm to cause the fruit to wrinkle after an exposure of about twelve hours. The oven is again heated, continuing to increase the temperature until the plums become firm, when they are flattened by pressure between the fingers, while under the process of desiccation. Great care is observed to remove the plums from the oven as soon as they arrive at a certain stage of dryness to prevent them from cooking too much. Finally, after the prunes are properly baked, for the last time, the oven is heated as it should be for bread, in which the plums are exposed until they begin to swell and bubble, when they must be taken out. As soon as the temperature of the oven falls to about half heat, the prunes are put back to remain over night; then, if properly cooked, they are covered with a beautiful white "bloom." They are then assorted by sizes and packed in baskets, boxes or jars for sale or use.

If it is desirable to make what are called "Pruneaux fourrés," the stones are taken out when they are about half done, and an-

other plum inserted in its place, which has also been deprived of its stone, and the cooking continued as above.

Raisin Grape vines.—Two varieties of small grapes, the "Vigne Chevelére" and the "Vigne Corinth," from which are made the Ascalon, Stoneless or Sultana raisins, and the Zante or Corinth currant, imported from France, and principally distributed in the middle and western States. The berries are small, often without seeds, with a fine pulp and an agreeable flavor. They are much used in a dried state in domestic cookery, and should they succeed in this country will add to the many varieties of useful and wholesome fruit already introduced. The English name of "currant," given to the "ribes rubrum," arises evidently from the similarity of that fruit to the small grape of Zante, or the common grocer's "Corinths" or "currants."

The Levant and the Grecian islands supply the largest proportion of dried currants for the markets, and retain their reputation by the general superiority of the fruit they furnish. Spain, Italy, and the southern portions of France also supply a considerable amount. The method pursued for making those currants varies somewhat with the locality and the variety employed. They are more easily prepared than the larger grapes, which are known in commerce under the name of "raisins." These require to be dipped, in the first stage, into a pretty strong lye made of wood ashes, sweetened by an addition of aromatic plants, such as thyme, lavender, orange leaves, &c., but the small grapes here in question are merely gathered a few days after complete maturity, at the moment when it is perceived that the berries are about to fall from the vines. They are then placed upon hurdles of close wicker-work, or upon large sheets in the sun. When it is perceived that the berries are detaching themselves from the main stalk, although still preserving their stems, the operation is often hastened by striking the bunches slightly with a stick. The stalks are then separated from them by means of a sieve, and the dust and other remains are got rid of by winnowing; after this, they are packed in boxes, where they are pressed in closely, covered with thick paper, and kept in a dry cool place.

A very important point in the management of all varieties of grape, is the mode and season for pruning. No general system or rule will suit. Experience must be the guide as to what will answer best in different climates, soils, and situations. A method which will do well in the north, may be destructive to the plant in the south.

Jujube Plum, (Zizyphus sativa,) a small tree or thorny shrub, from the south of France, bearing a reddish plum, about the size of olives, of an oval shape, and sweet, clammy taste, including a hard oblong stone, pointed at both ends. From this fruit is made the "Jujube paste" of the shops. In Italy and Spain, it is served up at the table in deserts during the winter season, as a dry sweet meat. These seeds have principally been distributed in the middle and southern states.

Pistachio Nut, (Pistacia vera,) an extremely interesting tree, has been imported, not merely on account of its ornamental character, but because it is useful and produces agreeable nuts. For this twofold reason, a quantity of them has been imported from the southern part of Europe, and widely distributed throughout the middle and southern sections of the Union. In favorable situations, it will attain a height of fifteen or twenty feet, and frequently while yet a mere shrub of five of six years standing, will bear. Its branches spread out widely, without being numerous, and the trunk is covered with a grayish-colored bark. The inflorescence takes place about April or May. The male flowers, which appear first, shoot from the side of the branches in loose panicles, and are of a greenish tint. The female flowers put forth in clusters, in the same manner.

As the pistachio tree is diœcious, it is necessary to plant male and female trees together, or they will not produce. The nuts are of an oval form, about the size of an olive, slightly furrowed, and of a reddish color, containing, an oily kernel of a mild and agreeable flavor. It is a native of Persia, Syria, Arabia, and Barbary, and is supposed to have been introduced into Italy in the second century, by the Emperor Vitellius, whence it was carried into France, in the southern parts of which it is so far naturalized

as really to appear indigenous. Later still, that is, in 1770, it was introduced into England, where, in sheltered positions, it bears without protection from the cold of ordinary winters. The summers there are scarcely warm enough to ripen its nuts. Althongh severe frost is to be dreaded, it will bear a greater degree of cold than either the olive or the almond, and hence it is better adapted to the climate of our middle and southern states, where it is thought it could be cultivated with profit. The finest kinds are those known as the Aleppo and Tunis varieties; the former for its large size, the latter, though smaller, for qualities which recommend it to French confectioners, who cover the fruit with sugar and chocolate, and flavor creams and ices with it. The Sicilian pistachio nut is used in France, in the preparation of sausages, and in seasoning meats. It is considered as a tonic, and as beneficial for coughs and colds. It is frequently eaten raw, but oftener in a dried state, like almonds.

Maté or Paraguay Tea, (Ilea paraguariensis.)—We are indebted for the seeds of this shrub to the kindness of Lieut. Page, of the United States ship Water Witch, while engaged in exploring the sources of the Rio de la Plata, in South America. It is worthy the attention of persons living in the middle and southern sections of the Union.

As a tree, it is highly ornamental, and wherever the magnolia grandiflora will thrive, there it may be successfully cultivated. The inhabitants of Paraguay, and indeed most of those who use it on the southern part of this continent, attribute to it almost fabulous virtues. It is unquestionably aperient and diuretic, and produces effects very similar to opium; but most of the qualities so zealously attributed to it, may with some reason, be doubted. Like that drug, however, it excites the torpid and languid, while it calms the restless, and induces sleep. Its effects on the constitution, when used immoderately, are similar to those produced by ardent spirits; and when the habit of drinking it is once acquired, it is equally difficult to leave it off. The leaves of the plant are used by infusion, and all classes of persons partake of it, drinking it at all hours of the day, at their various meals, rarely, indeed, beginning to eat before tasting their favorite beve-

rage. Not only is this the case in Paraguay, Uruguay, and the Argentine Republic, but in Peru, Chili, and Ecuador, it is no less esteemed. They drink the tea from the spout of a pot which they call *maté*, adding to it a little burnt sugar, cinnamon, or lemon juice. The wealthier and more refined class draw it into the mouth through a tin or silver pipe called *bombilla*, which, being perforated with holes at one end, and inserted in the *maté* or tea-pot, enables them to partake of the liquid without swallowing the smaller particles of the pulverized leaves floating on the surface. The quantity of leaves used by a person who is fond of it, is about an ounce. The infusion is generally kept at a boiling temperature, but those who are accustomed to it seem to drink it thus without inconvenience. In the meantime hot water is supplied as fast as it is consumed, every visitor being supplied with his maté and pipe. If allowed to stand long, the tea acquires an inky color. The leaves, when fresh, taste somewhat like mallows, or inferior Chinese green tea.

Morocco Dressers' Sumach, (Rhus coriaria,) from the south of Europe. The seeds of this shrub have been imported for experiment in the middle states, where it is thought it will be adapted to the climate. It usually grows from six to eight feet in height, on dry, sandy, or rocky soils in exposed situations. The branches and leaves are imported into this country in a ground state, and employed for tanning leather. It is said they are used in Turkey and Barbary for preparing the Turkey morocco from the skins of sheep and goats. The seeds are sold at Aleppo, where they are eaten to provoke an appetite.

Furze, (Ulex europæus,) from Brittany, in France, a low, prickly shrub, used as an excellent green fodder for cattle, when bruised. It was imported for a hedge plant, in the middle and southern states, and is described in another part of this volume.

French Broom, (Genista scoparia,) from France, a low, hardy shrub, growing from three to nine feet in height, with numerous straight, sharp branches, and used as fodder for sheep and for

making brooms. It will grow on any dry, meagre, or sandy soil, and is well adapted for protecting the soils of the embankments and cuttings of railroads.

I am, dear sir, very respectfully,

Your obedient servant,

D. J. BROWNE.

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